DOCUMENT RESUME

ED 231 943 CE 035 511

AUTHOR Huws, Ursula
TITLE New Technology and Women's Employment. Case Studies from West Yorkshire.
INSTITUTION Leeds Trade Union and Community Resource and Information Centre (England).
SPONS AGENCY Equal Opportunities Commission, Manchester (England).
REPORT NO ISBN-0-905829-63-8
PUB DATE Dec 82
NOTE 131p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC06 Plus Postage.
DESCRIPTORS Case Studies; *Employment Opportunities; *Employment Patterns; *Employment Problems; Equal Opportunities (Jobs); *Females; Influences; Job Layoff; Labor Force; Labor Turnover; *Labor Utilization; Questionnaires; Reduction in Force; Sex Bias; Sex Discrimination; Sex Role; Surveys; *Technological Advancement; Technology; Unemployment
IDENTIFIERS *England (West Yorkshire)

ABSTRACT

A study examined the impact of new technology upon women's employment in West Yorkshire in Great Britain. During the study, 2,000 copies of a questionnaire were distributed to past and present users of the Leeds Trade Union and Community Resource and Information Centre (TUCRIC) as well as to participants at a conference entitled Women and New Technology that was held in November 1979. Based on data obtained from the 40 questionnaires that were completed and returned, the researchers developed outlines of the position of female workers both nationally and in West Yorkshire. In addition, the researchers developed case studies of 27 workplaces that are currently using new technology in areas such as mail order companies, public agencies, banks, manufacturing firms, universities, libraries, warehouses, research and development organizations, and engineering firms. Because of traditional patterns of job segregation and inadequate education and training in scientific and technical subjects for women compared to men, women are disproportionately affected by the introduction of new technology. Not only are they more likely to lose their jobs, but they are also more likely to find that the quality of work has deteriorated in the jobs that remain. (MN)

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New technology and women's employment

case studies from West Yorkshire

Leeds Trade Union and Community
Resource and Information Centre

A research project funded by the Equal Opportunities Commission

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Leeds Trade Union and Community Resource and Information Centre

Leeds TUCRIC was set up in 1978 to provide information, research and resources for women's, community, and trade union groups and individuals. It has a variety of materials of use to those needing specific information or doing research in the area of women and new technology, including books, pamphlets and newspaper cuttings, as well as material on new technology generally.

Leeds TUCRIC, 1st Floor, Market Buildings, Vicar Lane, Leeds 2.
Telephone: 0532-439633

The Author

Ursula Huws has been doing research on women's employment, particularly as it is affected by technological change, since 1978. Her current project, commissioned by the EOC, is on new forms of homeworking.

The Report

Parts of this report were previously published in November 1980 by Leeds TUCRIC under the title The Impact of New Technology on the Working Lives of Women in West Yorkshire: Interim Report by Leeds TUCRIC.

Equal Opportunities Commission
Overseas House
Quay Street
Manchester
M3 3HN

Telephone: 061-833 9244

ISBN 0 905829 63 8

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INTRODUCTION

Since 1978, when the possible effects of microelectronic technology first became a matter of major public concern, a large number of reports have been published on the social and economic effects of the 'new technology' as it has come to be known. These have been produced by Government Departments, commercial organisations, academic institutions, trade unions, political parties and a variety of other bodies, and have produced an alarming and confusing range of predictions, often of apocalyptic proportions: new technology will create mass unemployment; it will increase employment and bring prosperity to all; it will transfer wealth to the Third World; it will further impoverish the Third World; it will lead to an increase in women's employment; it will decimate women's employment. These, and other mutually incompatible forecasts, have one feature in common: they are based on inadequate empirical research. In the absence of concrete information about what actually happens when new technology is introduced, their authors have been obliged to base their predictions on a combination of extrapolation from past trends, analysis of macro-economic statistical data, assumptions that what is technically possible will in fact happen and generalisation from a few small-scale studies of the effects of new technology in specific workplaces, usually confined within one sector of employment.

The reasons for this are understandable enough:

The speed of the introduction of new technology.

The world-wide scope of its introduction.

The range of application of the microprocessor, spreading as it does across virtually all products and processes.

The interconnectedness of its introduction with other factors governing social and economic developments.

These, and other factors, produce a pattern which is so

large, so rapidly changing and with so many variables that it is impossible, using any of the traditional research disciplines, to abstract one 'slice', and construct a framework for subjecting it to scientific scrutiny with any confidence that the results will produce useful information about the pattern as a whole. In such a situation, and faced with widespread and urgent public concern, the 'informed guess' has been the only feasible basis on which researchers could prepare their reports, and these have served a useful purpose in enabling a wide variety of organisations to formulate immediate responses to the prospect of an extensive introduction of microprocessor technology.

Nevertheless, the need for empirical research remains, and this project was set up with the aim of making a contribution in this sphere by attempting, not to make large-scale predictions about the overall impact of new technology, but to look at what is actually happening in one area, West Yorkshire, across the whole spectrum of employment. It was decided to concentrate in particular on women's employment for two reasons:

Firstly, because it seemed likely that the introduction of new technology would have transforming effects on domestic life and on the nature of communities, and that a study of women's employment would shed greater light on the ways in which workplace and community interact, given that women are more likely than me to have domestic responsibilities and to be affected by the availability of public services in their access to employment.

Secondly, because of the concentration of women in service sector employment and in unskilled and semi-skilled manufacturing jobs (both areas where new technology is being rapidly introduced), many commentators have predicted a disproportionate impact on women's employment.

Whether these effects result in increased opportunities for women, or declining job prospects, it seemed important to discover what they are, so that the implications of technological developments for equal opportunities could be evaluated.

Because of the complex interplay of social, technological and economic forces governing the introduction of new technology, women's employment and regional development, it has been found necessary to devote rather more space than is usual to defining the project's frame of reference and the methodology employed. To readers who find this tedious, I apologise.

I should like to thank the Equal Opportunities Commission for funding this work, and the staff and management committee members of Leeds TUCRIC for providing the framework in which it was possible to carry it out. In particular, I am grateful to Quentin Outram, secretary of the Management Committee, for patiently guiding me through the morass of British labour statistics and for his unfailing willingness to be pestered, and Jude Stoddart for her seemingly inexhaustible supplies of encouragement, constructive criticism and practical help. Thanks also to the Yorkshire Women and New Technology group and to all the friends and users of TUCRIC who took the time and trouble to distribute and complete questionnaires. And at last, but not least, many thanks to Margaret Saville for her invaluable help in analysing the questionnaires and to Leeds Polytechnic for the placement which made her work possible.

Ursula Huws
February 1982

CHAPTER ONE

BACKGROUND TO THE STUDY

NEW TECHNOLOGY AND WOMEN'S EMPLOYMENT

1. THE TECHNOLOGY ITSELF

Since there is a large body of literature already in existence describing microelectronic technology and its applications no useful purpose would be served by re-defining here what a microprocessor is and the wide variety of technical possibilities opened up by its adoption. The term 'new technology' is used throughout this report in a 'common usage' sense, to refer not just to narrowly-defined applications of the microprocessor itself, but to related technologies such as the use of optical-fibre cables, robotics, remote sensing and control devices and developments in software and storage technology for which practical applications have become possible as a result of the 'silicon chip'. The term also covers some activities which have been possible for some years using traditional mainframe computers, but which have become candidates for widespread application as a result of the cheapness and flexibility of the microprocessor technology.

There are a number of different ways, some direct and some indirect, in which the introduction of new technology can affect the numbers of jobs available in any given area, and it is important to distinguish between them.

Direct Effects

The effect of new technology on jobs which attracts the most public concern is when it enables the same product to be produced or service provided as in the

past with a smaller number of workers. An oft-cited instance of this is the introduction of robots into car factories; for example in one case seven men working in conjunction with robots spot-welding car bodywork achieved the same output previously produced by twelve men. The robots paid for themselves in two years.[1] In another case, in a Volvo factory, it was found that the introduction of robots for a similar process reduced the number of operatives per shift from fifty to ten.[2] Similar dramatic instances of reduction in the number of jobs as a result of the introduction of new technology are given in offices where word processors have been introduced, for instance a Medical Centre in Arizona (which included a large proportion of non-clerical staff) reported a 4% decrease in staff after the introduction of word processors, despite a 25% increase in the number of lines typed.[3]

Looking at the labour-saving effects of new technology over a slightly longer time-span, the Norwegian Insurance Company, Storebrand, discovered after they had introduced word processors that thirteen people were doing the work which had required seventy-five in 1953.[4] In another example it was discovered that the preparation and checking of football pools which had previously occupied 130 part-time workers for seven to fifteen hours could be done by two people in three and a half hours using a computer.[5]

Direct effects of new technology on employment also include the creation of new jobs, either in producing the hardware and software of the technology itself (e.g. silicon chip manufacture) and products made possible by it (e.g. calculators or digital watches) or in creating posts which did not previously exist where new technology is introduced into other work processors (e.g. data processing, maintenance of new machines, word processor pool supervisors).

Whether the net direct effects of new technology are labour reducing or labour expanding is a subject of considerable debate, and much contradictory evidence. The Central Policy Review Staff, reporting in 1978,[6] and using the example of the Civil Service, came to the conclusion that a net gain in jobs had been the result of computerisation, since there had been a growth between 1970 and 1977, from 170,000 to 200,000 staff in computer-related posts. However, a Swedish study looking at the overall effects of computerisation on employment between 1965 and 1975[7] concluded that there was a net loss of jobs, 30,000 having been created while 90,000 were lost. The most comprehensive survey of case-studies in technical change and employment encountered in the course of this work, commissioned by the Six Countries Programme on Aspects of Government Policies towards Technical Change[8] came to fairly pessimistic conclusions, arguing that most investment in technology currently taking place is directed towards rationalisation rather than growth, and will result in an overall loss in jobs.[9] This view appears to be echoed by the authors of a report commissioned by the Department of Industry from Massachussetts Institute of Technology in 1979, who conclude that 'All effects on users' employment levels appeared to be either employment effects due to microprocessors tend to be hidden. A shift in jobs within the same firm may actually cause simultaneous layoffs and new hirings. There may be reduced labour used per unit of output, but market expansion obscures this fact by requiring greater employment on the whole. The combination of effects makes it difficult to determine which are specifically attributable to the advent of a product using a microprocessor'.[10]

In both these reports, case-studies were selected within particular industries or sectors of industry, and it is possible to argue that such an analysis tends to focus on job loss without taking account of

new jobs being created elsewhere in the economy. Most of the British Government publications surveyed, which viewed the question from the point of view of economy as a whole, took a more sanguine view, arguing, as in the case of the Department of Employment, that technology-created unemployment would be of a transitional nature[11] or, in the case of the Cabinet Office Advisory Council for Applied Research and Development (ACARD) that 'more unemployment results from loss of market share following a failure to innovate than from the introduction of new technology. Conversely, if new technology leads to an increase in market share there is generally an increase in employment opportunities'.[12]

Indirect Effects

The indirect effects of the introduction of new technology on employment levels fall roughly into four categories: effects of changing location of employment on jobs in a given area; effects on producers or providers of services made obsolescent by new technology; effects on firms competing with innovating firms; and spin-off effects on suppliers, providers of services and on the local economy generally.

1. Effects of changing location

Recent research in the United States[13] suggests that the widespread introduction of new technology is bringing about major changes in the distribution of employment between regions. In June 1980, when the overall unemployment rate in the US was 7.7%, unemployment rates were significantly higher in the states such as Michigan (14.7%), Ohio (9.7%) and Illinois (8.6%) where the traditional manufacturing industries such as steel, automobiles and rubber are

sited, while they were significantly below average in the areas where the new high technology industries are concentrated, such as Texas (5.5%), California (7.3%) and Massachussetts (6.8%). At the same time, when the average drop in profits was 9% in a sample of 521 corporations surveyed by the Wall Street Journal, high technology firms showed a marked increase in profits, for instance, office equipment (up 13%), electrical and electronic equipment (3% - almost certainly this figure would be higher if electronics was separated from the traditional electrical equipment manufacturing), tools and machinery (8%) and 'speciality' (12%). The suggestion is that the introduction of new technology precipitates the expansion of some industries and the contraction of others, with differential effects on employment in different parts of a country.

The existing industrial structure of a region can affect technology-related employment in other ways: the Cambridge Economic Policy Review group[14] considers that the degree of concentration of small firms will significantly influence the generation of new jobs in an area, arguing that new small firms, likely to make innovatory use of new technology and thus generate new employment are most likely to be set up in areas where there are already significant numbers of small firms, since they tend to be founded by individuals breaking away from existing firms, with experience gained from seeing how they are operated. It has also been argued[15] that areas containing a high proportion of branch plants and a low proportion of head offices of large companies suffer disproportionate employment loss when new technology is introduced, since the new jobs are likely to be based at or near the head office, and branch plants to become dispensible.

The introduction of new technology does not just bring about a redistribution of employment between

regions of one country; it can also facilitate the transfer of all or part of a production process to other countries. Frobel, Heinrichs and Kreye, in their monumental survey of 'the new international division of labour'[16] instance three ways in which the introduction of new technology has facilitated the transfer of production to Third World countries: firstly, developments in telecommunications and information technology have made it technically feasible to co-ordinate activities between plants in widely separated parts of the world; secondly, miniaturisation has drastically reduced the size and quantity of components, making it relatively inexpensive to use air-freight to transport them from one site to another; and thirdly, by reducing the skill content of many jobs, new technology has made it possible for companies to free themselves from their traditional dependence on proximity to sources of highly-trained, skilled labour. During the recession, with declining profitability and increased competition, the pressures on companies are likely to increase to consider how they can rationalise production and reduce costs and reorientate themselves in relation to suppliers and markets, further accelerating this trend towards investment in the low-wage 'free export zones' of the Developing countries, at the expense of employment in the traditional manufacturing areas of the developed countries.

The Council of Europe[17] has noted this trend with concern, citing research on major European-based electronics companies which showed that 'from 1971 to 1976 Phillips reduced its workforce in the Netherlands by 13%, increasing it by 14% abroad; from 1970 to 1977 the Siemens workforce in Germany fell by 11% and increased by 43% abroad; the figures are even more striking for AEG, with a decrease of 17.5% in the workforce in Germany and an increase of 66.7% abroad'.

2. Effects of Providers of Obsolescent Goods and Services

When new technology is introduced into a product or a process it is very rarely fulfilling a brand new function. Generally it is replacing an existing product or performing an activity previously carried out in other ways. The range of products which could potentially be displaced by the widespread introduction of the microprocessor is enormous, varying from car components to egg-timers, from letterboxes to mechanical typewriters. Perhaps the most quoted example of the dramatic effects of this displacement process on employment in an industry is that of the Swiss watch industry. As a result of competition from cheap digital watches, 'some 20-30% of the assembly labour in Switzerland was displaced, resulting in Federal intervention for the first time; and trade estimates suggest a swing in balance of payments of at least 250 million dollars per annum'.[18] The mechanical cash register industry suffered a similar fate, and it has been estimated that competition from electronic cash registers was a major contributor to the fact that between 1970 and 1975 one company, National Cash Register, reduced its workforce in manufacturing by more than 50%, from 37,000 to 18,000.[19]

The effect of technology-related obsolescence on service jobs is less well-documented, but the reduction in numbers of components and easy replacement entailed by the substitution of mechanical parts by microelectronic ones seems likely to affect employment in a number of maintenance and repair occupations, for instance, television repair, watchmending and vehicle repair. The decline of the small independent garage has been predicted by at

least one commentator[20] and others have foreseen a decline in maintenance work across the transport and communications sector. Other 'service' functions are likely to decline as electronic technology replaces mechanical or human activity, such as messenger services, library search services and travel agencies.

3. Effects on firms competing with innovating firms

Besides creating obsolescence in other goods and services, the introduction of new technology into existing products and processes by some establishments can affect other, non-innovatory organisations even though there is still a market for the goods and services which they are providing. This is a result of the cheapness and efficiency of the new technology, which enables the innovating firms to offer their customers cheaper prices, faster delivery times or efficiency of service which cannot be matched by their competitors using traditional methods. An example of this in manufacturing industry has been the decline of the UK television industry since 1970, because of its failure to compete with the technologically more advanced Japanese industry, which took advantage of microelectronics to bring about a drastic reduction in volume of components, and hence in costs of ssembly. Between 1970 and 1977, components in the average Japanese 20" colour set were reduced in volume by almost 100% in transistors, 80% in dionides, and about 80% in other parts. The amount of electricity consumption per set was also decreased from 155 watts to 85 watts during the same period - an additional incentive, at a time of rising energy costs, for customers to buy Japanese.[21] Had the UK industry not decided to adopt Japanese methods (entailing a 50% reduction in assembly jobs for

Thorn Electrical Industries) the result would probably have been complete closure, causing even greater job loss.

Many other sectors of manufacturing industry are vulnerable to competition by overseas innovating firms in this way, but a similar pattern can develop within the national economy. In sectors of manufacturing where relatively small firms still predominate, the reason for not innovating may not simply be a lack of expertise or foresight but could be because the company is too small to be able to afford to re-equip or to take advantage of the economies of scale which new technology offers. In bespoke tailoring, for instance, most firms are much too small to offer their customers anything which can compete with the results of the computerised cutting system introduced recently by Hepworths.[22]

In services similar far-reaching effects have been forecast. In retailing, for instance, it is predicted that the introduction of new technology in large supermarkets will have its greatest impact on employment not in the supermarkets themselves, but in small shops, many of which may be forced out of business by their inability to compete with the prices offered by large stores which can take advantage of economies in accounting, stocktaking and other previously labour-intensive tasks by investing in new technology. At present, the greatest savings can be achieved by use of an automatic check-out system which incorporates laser technology for automatic reading of bar-codes printed on the products. This not only enables very rapid transit through the check-out (saving on numbers of checkouts, and therefore staff to operate them, as well as being more attractive to customers), but also means that the transaction is recorded, enabling stock and sales records to be kept up-to-date automatically. If such a system is linked in with a

mainframe computer, this information can be transmitted automatically to a central warehouse, saving not just on staff and other overheads, but also on stockholding. Such a system (1980 prices) costs in the region of £130,000 - well beyond the means of most small shops.[23]

In retailing , it could be argued that this is largely an acceleration of a downward trend in small shopkeeping, already present before the introduction of microelectronic technology, but there are other services where similar effects seem likely for which no such decline had been anticipated. To take just one example, it seems highly likely that the introduction of computerisation by a few large estate agents, which has recently entered public awareness as a result of extensive television advertising, will have detrimental effects on competitors who fail to innovate, with consequent effects on employment.

4. Spin-off effects

The changes in structure, location and purchasing patterns of organisations affected by new technology also has spin-off effects on other sectors of the economy. Suppliers to firms which are contracting or expanding will tend to be affected negatively or positively as a result.

For instance, the growth of electronic information systems, at the expense of paper-based ones, is expected to affect the paper industry[24] and the prospect of smaller, more highly-automated offices, ith an increasing amount of office workers being fed their tasks through a VDU at home has led commentators to predict, in the longer term, negative effects on the transport industry, office building and catering.[25] To these one could add office cleaning and maintenance and the wide range of retailers (such as stationers, confectioners and

newsagents) which depend on their proximity to offices for a large proportion of their trade. Suppliers of specialist services to affected firms, (e.g. telephone-cleaning, typewriter maintenance, laundry services, staff agencies, printing) would also be affected by major changes in office organisation. Changes in manufacturing would have similar spin-off effects, e.g. on the road haulage industry.

It is likely that the spin-off effect on employment will not be entirely negative. In a buoyant economy, it is reasonable to expect that new services would rapidly emerge to cater for new needs. It is not difficult to imagine, for instance, a demand for mobile VDU maintenance services, for retail floppy disc outlets, increased employment in data processing training, or, given the greatly increased numbers of people likely to be exposed to VDUs, and therefore to eye-strain,[26] a boom in opthalmological employment. Among the indirect spin-off effects of the introduction of new technology it would also be possible to include the multiplier effect of changing levels of output, such as the effects of reduced incomes on consumer spending, leading to lower employment in consumer-goods manufacture and distribution.

2. EMPLOYMENT STATISTICS.

British statistics are gathered in such a way that makes it difficult to judge the effects of new technology on work. The classification of employment data by industrial sector, using Standard Industrial Classification System (SIC) reveals two problems for the investigator.

Lack of information on occupational structure

The occupational categories are too broad to provide information of the effects of new technology at work, even when they are broken down into Minimum List Headings (MLH). There are problems connected with most of the statistics available and these are outlined below:-

- The Census of Population which presents a systematic collection of detailed information about occupations takes place decennially. However, there is some delay between collection and publication. The data on economic activity (10% sample) from the 1971 Census, was not published until 1975.

- The New Earnings Survey (NES) published annually provides data on employment by occupation, however, there is no regional breakdown by both industry and occupation and the occupational data is insufficiently detailed for this project. Nevertheless, the NES has proved useful as a relatively up-to-date source of information about the distribution patterns of full and part-time working.

- The D of E Census of Employment does provide some general information about occupations, but again the categories are too broad to be of use within this project. It is possible, as an example, that the introduction of new technology could simultaneously bring about an increase in technical employment and a decrease in clerical employment in an industry, which would not appear as a significant change in the figures, although it could have major implications for equal opportunities.

-

Unemployment data collected by the Department of Employment, however it is regarded, is unreliable for various reasons. Firstly, the unemployed do not necessarily register under the occupation from which they have been displaced, especially if they see little chance of gaining new employment in the same field. Secondly, the registered unemployed count is lower than actual unemployment. The EOC estimated in 1980, that total female unemployment, which officially stood at 460,000 was actually over 700,000.[27]

Alterations in Industrial Structure

The classification of occupations by SIC seems based on an implicit assumption that the industrial orders represent constant, unchanging categories, and gives an impression that the activities carried out within each order remain substantially the same over time. The increased size and diversification of large companies, with interests spreading across several orders has made divisions between orders increasingly artificial. Between 1953 and 1972 alone, the share of the one hundred largest enterprises in manufacturing net output increased from 27% to 41%.[28]

The development of microprocessor technology and some of its first application has highlighted the growing convergence and interconnection between industrial orders. Integrated office systems, for example, are currently being developed by computer manufacturers (IBM); typewriter manufacturers (Olivetti); reprographic equipment (Xerox); and telecommunications companies (ITT).[29] Similarly, digital watches were developed by hardware producers, software producers and manufacturers of traditional watches. Such developments have led some commentators to coin new phrases such as 'telematic' to describe the new sectors formed by the convergence

of older technologies.[30] However, this phenomenon is described, it is clear that existing classification systems are woefully inadequate in supplying the means to measure and analyse the changes taking place in our industrial structure.

In order to arrive at a reasonably accurate picture of the occupational structure of women's employment in West Yorkshire, the following procedure was followed:-

- Census of Population data, adjusted for boundary and other changes by C. H. Lee in British Regional Employment Statistics 1841-1971[31] were used to construct a historical picture, augmented by Department of Employment Census on Employment data on administrative, technical and clerical staff in manufacturing industries published in British Labour Statistics: Historical Abstract 1886-1968[32] and, for subsequent years, the Department of Employment Gazette.

- The 1971 Census of Population[33] for a complete occcupational breakdown of women's employment in the West Yorkshire conurbation, these were analysed as a percentage of employment in each industry (SIC) and these percentages were then applied to the latest employment figures available for the area. These were Department of Employment Statistics of Employees in Employment by industrial order in West Yorkshire County in 1977 which were kindly made available by the Regional Office of the Manpower Services Commission.

While this is the nearest approximation it is possible to get to an accurate picture of the current occupational breakdown of women's employment in West Yorkshire using existing employment data, it is inadequate in several ways. It assumes that the

relative distribution of employees by occupation within industries has remained constant since 1971. The sources used give different geographical breakdowns, the Census giving data for the West Yorkshire Conurtation and the Department of Employment data for West Yorkshire County. This was caused by the reorganisation of local government in 1974 and makes both sets of data incomparable geographically. The speed of introduction of new technology means that some information for 1977 is out of date. Comparability and therefore, the reliability of the source data has been put into doubt by Buxton and Mackay[34] who point out substantial discrepancies between the 1971 Censuses of Employment and Population.

The above limitations have made it important not to rely exclusively on statistical data but to supplement it whenever possible by references to other sources; including response to questionnaires distributed as part of the project's work.

3. TRENDS IN SERVICE EMPLOYMENT

During the 1970's, it was usual to assume that the established trend of a steady decline in the numbers of people employed in manufacturing industry, and a steady increase in those employed in services, would continue. Projections of future employment in West Yorkshire for example like those in the West Yorkshire Structure Plan[35] were largely based on a belief that service employment would continue to mop up workers displaced from textiles, clothing, footwear and engineering (the staple manufacturing industries of the area) and an increase in unemployment would be avoided. There were, however, several trends already present during the early 1970's which indicated that this might not be the case.

Nationally, a very high proportion of the new jobs jobs created in services were part-time ones; between 1971 and 1976, approximately three-quarters of all jobs created in miscellaneous services were part-time ones, and in distributive trades during the same period there was an overall loss in full-time jobs as more part-time jobs were created than the total employment gain for the industry. While this trend could be welcomed as evidence of increasing employment opportunities for women with domestic commitments which make full-time working impracticable, or even as an indication of a trend towards an overall reduction in working hours, it does cast doubt on the simple equation: a job lost in manufacturing + a job gained in services = no overall job loss. The substitution of part-time for full-time jobs may not appear as a loss of employment in terms of numbers of jobs but it does represent a significant fall in the amount of work available overall. It seems likely that the use of employment statistics to measure the expansion of service industries has caused a significant over-estimation of the rate at which they have expanded.

Another factor which makes continued expansion of employment in services unlikely is the effect of cuts in public expenditure, likely to cause job loss or inhibit expansion in public services, which account for a large proportion of employment in professional and scientific services and transport and communications, and virtually all employment in gas, electricity and water and in public administration and defence.

A further significant trend in the service sector during the past decade has been a steady increase in productivity, measured as the relationship between output and employment.

Output rose much faster than employment in all the

service industries apart from professional and scientific services between 1966 and 1976. Harris and Taylor, who document this trend, conclude that 'much of the service sector is just as amenable to productivity improvements as is the manufacturing industry; it is difficult to envisage their output growing sufficiently fast to outstrip labour-saving influences'.[36] In other words, while productivity continues to rise in the service industries, they are unlikely to continue to be a source of new jobs.

In Britain, productivity in the service sector is considerably higher than in many other countries. In Japan, for instance, distribution, a major service industry, absorbs 22 per cent of the national labour force, almost double the percentage it is in the United Kingdom.[37] Nevertheless, compared with manufacturing industry, productivity in services throughout the world is still low. Franco de Benedetti, Managing Director of Olivetti, estimated in 1979 that in offices productivity had grown by 4% in the previous ten years, against a growth in numbers of staff of 45%, compared with an 80% productivity growth in numbers for production workers.[38] This is partly a product of the fact that the office sector is undercapitalised in comparison with manufacturing or agriculture. The International Labour Office estimated in 1980 that 'the typical office worker in advanced countries of the West is supported by only 2,000 dollarsworth of equipment, by comparison with fifteen or twenty times that amount for factory workers'.[39]

It is against this background - increasing part-time employment, making lower increases in employment than suggested by the statistics; declining employment opportunities in the public sector; increasing productivity; and a low level of capital investment in offices - that we must set the introduction of new technology, and the question of how it is likely to affect women's employment opportunities.

CHAPTER TWO

METHODOLOGY

Given the situation outlined in the previous chapter, where measuring the effects of new technology is difficult and complex, where analysis of employment statistics yields only limited results, and where employment trends are subject to complicating factors, it was important to decide what methodological approach would yield the most fruitful results. A sample survey representative of all types of workplace and industrial sectors throughout West Yorkshire would have required resources considerably greater than were available to the project. However, because of the inadequacies in the available data referred to previously, it was felt to be crucially important to collect up-to-date information on what was happening in workplaces in the area. The aim was not to document exhaustively the extent of the introduction of new technology throughout the area, nor to highlight dramatic instances of change resulting from its introduction, but rather to paint a general picture of the kinds of changes occurring, and how those changes might affect women workers.

The project evolved in three stages. Firstly, it was important to establish what was theoretically possible in the way of change brought about by new technology. Given all the work that had already been done in this field, what kind of change should we be looking out for? At the same time how were women workers likely to be affected, given their particular employment patterns? These questions were refined and clarified through an extensive literature and statistics survey, and the information gleaned from this is broadly outlined in the first chapter of this report, and incorporated into the sections on women's employment in West Yorkshire and the likely effects of new technology.

Secondly, it was necessary to develop a picture of what was actually happening in West Yorkshire. Where are women in West Yorkshire working? What are the characteristics of women's unemployment in the region? How is new technology affecting particular sectors of the economy? To answer these questions, various resources in the region were tapped, the starting point being the resources of TUCRIC itself, both in terms of information such as press cuttings and in terms of contacts in trade unions and industry. Many of these contacts were approached and interviewed. Trade union officials, employers, workers, members of Industrial Training Boards, politicians, planners, other researchers - all of whom could make a contribution towards painting an overall picture of the region - were contacted and asked to give their views. By means of these discussions it was possible to define the kinds of questions it would be fruitful to ask in the third stage of the project, the questionnaire survey.

Given the limited resources available to the project, it would not have been possible to find and analyse a representative sample of workplaces affected by new technology. Therefore the purpose of the questionnaire was to focus on individual firms who had introduced technological innovations, however small, and to find out how and why they were innovating. In addition, it was important to document the specific changes in individual workplaces that had taken place as a result. These changes would include not only changes in employment levels and patterns, but also changes in the overall quality of working life, including skill levels, promotion prospects, health and safety, and control over work. Because the whole purpose of the exercise was to get a feel for what was happening, and not simply to document large-scale, dramatic type of technological innovation, the questionnaire was distributed as widely as possible, in the knowledge that this would produce some interesting cases which would not have been reached if only dramatic examples had been sought.

Two thousand copies of the questionnaire were distributed as follows: by post to all past TUCRIC users who had enquired about new technology; to all current TUCRIC affiliates; and to all participants at the 'Women and New Technology' conference held in November, 1979. In addition, some local trade union branches distributed copies amongst their members, and copies were distributed by hand at trade union conferences and training schools in the area, and copies were given by the main providers of trade union education in the area to shop stewards and safety representatives attending TUC day-release courses. Finally, spare copies were kept in the TUCRIC office to be given to new affiliates and users of the library and enquiry service.

Forty of the two thousand questionnaires were completed and returned. With such a low response there is a danger, firstly, of extrapolating too much from the data collected, and secondly, of gleaning data only from those who might have been predisposed to thinking about and taking some kind of action on new technology, in other words of only gaining data from a biased sample.

As far as the first point is concerned, we have been careful not to make generalisations on the basis of the questionnaire data alone. We have used it rather to supplement the general data based on the literature and the informal talks, to fill out the picture and make it more immediate and specific. The data is presented in Chapters 5 and 6, and should be regarded as providing points of interest, and as pointing to fruitful areas of further research, and is not intended to stand as a universally valid and complete statement on the effects of new technology and their relationship to women's employment.

The second point, concerning bias on the part of the respondents, has no easy answer. However, it must be pointed out that only nine of the forty questionnaires returned were from people who had used TUCRIC's facilities, and none were received from people who had

attended the Women and New Technology conference. Both of these groups could be expected to have some preconceived opinions about new technology and its effects on women workers. Overall, there did not appear to be any common reason or motivation on the part of the respondents for returning the questionnaire. They represent a fair cross-section of industries and types of occupation. Although the questionnaire survey makes no claim to be based on a representative sample, nonetheless the researchers feel that the data provided by the responses well illustrate the kinds of problems that are occurring when new technology is being introduced in the workplace.

Based on the data thus collected, the remaining chapters of this report will outline the position of women workers nationally and in West Yorkshire, the effects new technology may have in the various sectors where women work, and finally will present the information on individual workplaces gained from the questionnaire.

CHAPTER THREE

WOMEN'S EMPLOYMENT IN WEST YORKSHIRE

This Chapter provides an overview of women's employment in West Yorkshire, as the context in which the results of the questionnaire survey must be seen.

West Yorkshire Metropolitan county, which comprises the five Metropolitan Districts of Bradford, Calderdale, Kirklees, Leeds and Wakefield, has a population of slightly over 2,000,000, which constitutes about 40% of the total of the Yorkshire and Humberside region. Approximately 870,000 of these people are economically active (1976 figures) with a distribution between major industry sectors which does not differ greatly from the national pattern. The main variation from the national picture is in the higher proportion of employees (7%) employed in manufacturing, and the lower proportion (6.2%) employed in services. There is a concentration of employment in certain orders within these sectors, notably in mining, in the primary sector, and in engineering, textiles, and clothing and footwear in the manufacturing sector. All of these orders have seen a significant decline in employment since 1971. In the service sector, on the other hand, there has been an increase in employment in each category. This overall pattern of decline in primary and manufacturing employment accompanied by an increase in service sector employment is characteristic not just of the United Kingdom, but also of other advanced industrialised countries. The greatest difference between West Yorkshire and Great Britain as a whole in terms of employment is that West Yorkshire has, on average, significantly lower wage rates.

As far as the growth of women's employment is concerned, this too has matched that in Britain as a whole fairly closely. In 1901, women were 28.9% of the employed workforce in West Yorkshire, compared with 29.2%

nationally, and by 1971 women formed an identical proportion of the workforce locally and nationally, i.e. 36.7%. However, a closer look at the breakdown of employment in the industries which are the main employers of women shows that in some industries there have been marked variations from the national pattern. In Professional and Scientific Services, women's employment in West Yorkshire grew more rapidly than in Britain as a whole - by 600% as compared with 489% from the beginning of the century, and by 143% as compared with 108% in the post-war period. In the other services, West Yorkshire expanded its female employment slightly more than the rest of the country, with the exception of Banking and Insurance where the increase was 8 percentage points lower than the national average.

In manufacturing, however, the picture is more negative, with a particularly steep relative decline in mechanical engineering, where women's employment fell by 5% in the 1951-71 period in West Yorkshire despite a 35% increase in the industry nationally. The only manufacturing industries where the county's performance as an employer of women was better than the national average were food, drink and tobacco, with a 36 percentage points greater expansion than in the country as a whole, and metal manufacture, a less important employer of women, where there was an improvement of 5 percentage points over the national figure.

An examination of the occupations in which West Yorkshire women are employed reveals considerable concentration within certain occupational groupings, confirming the findings of research on the occupational position of women in the country as a whole.[40] The greatest numbers of women work as clerks, cashiers, typists and secretaries, followed by shop assistants, sewing machinists and a variety of textile trades. Cleaners, 'maids, valets and related service workers n.e.c.' and canteen assistants, with over 10,000 employees in each category, rank next in importance as female occupations in the area, followed by

teachers, sales managers and proprietors, and packers and labellers. Whereas many occupations, such as sewing machinists, textile occupations, and teaching fall tidily within the industrial categories used in statistical sources, many do not. For example, cleaners and clerical workers are to be found working in virtually every industry.

Table 1 (See Appendix II), gives an estimated breakdown of how women in these 'service' occupations were distributed between industries in West Yorkshire in 1977, the most recent year for which figures are available.

Occupations included in the categories 'managerial', 'clerical', 'scientific and technical', 'sales and distribution' and 'service' are as follows:

'Managerial' includes any occupations which have a managerial or administrative function. They include office managers, proprietors and sales managers, finance and insurance brokers and financial agents, administrators, officials of trade or professional associations and proprietors of small businesses such as farms, public houses and shops.

'Clerical' includes telephone operators and telegraph and radio operators as well as clerical workers.

'Scientific and technical' includes engineers, scientists, authors, journalists, artists, professional accountants, surveyors, architects, lawyers, draughtspeople and laboratory workers, as well as professional and technical workers not elsewhere classified.

'Sales and distribution' includes transport and communication workers and warehouse staff as well as sales staff.

'Service' includes guards and other security staff, waiters, bar and canteen staff, cooks, kitchen hands, maids, caretakers and housekeepers and all types of cleaners. 'Service, sport and recreation workers not elsewhere classified' are also included.

It can be seen from the table that women are thinly spread in the 'managerial' jobs, the largest concentrations being in distributive trades and miscellaneous services, probably in the main managers and proprietors of shops, hairdressers, restaurants and so on. A few women have risen to managerial positions in insurance and banking and public administration and defence, areas dominated by large institutions with established career paths, and there is an interesting group of 342 women farm managers and owners in the primary sector. Elsewhere, however, women are conspicuous by their absence. There are also comparatively few women in scientific and technical occupations in fact, these account for less than one per cent of women workers in West Yorkshire. The greatest concentrations of women workers are in clerical work (90,632) and 'service' (71,226), followed by sales and distribution (29,263). Between them, these three occupational groups account for well over half of all women's employment in the county.

In the manufacturing industries, it is safe to assume that the other women in employment, i.e. those not included in the 'service' categories, are engaged in production work. In the services, however, the other occupations are more varied, including teachers, nurses, doctors, social workers, etc., in 'professional and scientific services' and a wide range of occupations, such as hairdressers, laundry-workers, petrol pump attendants and researchers, in miscellaneous services.

If we add all the jobs in the service industries to the service jobs in the manufacturing industries we arrive at a total of 259,100 women in West Yorkshire in service employment, compared with only 82,900 working directly in production. In other words, about three-quarters of women's employment in the county is in a 'service' occupation. It is these occupations, therefore, which present themselves as the first candidates for scrutiny in any study of the future prospects for women's employment in the area. The probable trends in service employment have already been outlined in Chapter 1.

CHAPTER FOUR

THE POSSIBLE IMPACT OF NEW TECHNOLOGY

1. CLERICAL WORKERS

As we have seen, nearly 100,000 women in West Yorkshire are estimated to be employed in clerical occupations, and the future predicted for them in most of the literature about likely effects of new technology is not a rosy one. It can be summed up in the words of J. Rada, of the International Labour Office:[41] 'Only now, in the early 1980s, will office automation start to accelerate and is likely to cause major displacement .... The workers displaced will be mainly women, at a time of increasing female and general white-collar militancy. In some countries, family incomes will suffer'.

Although all commentators agree that the introduction of word processors and other forms of information technology into offices will cause some job loss, estimates vary greatly as to what the extent of this will be. Barron and Curnow consider that office automation has 'far greater social and economic impact than any other aspect of the information revolution'[42] and predict at least 10% job loss. Jenkins and Sherman[43] predict a 30% decline in employment in 'information processing' jobs, in which they agree with the influential French Nora/Minc report.[44] Some forecasts are even higher, for instance in 1978 Siemens predicted 40% job loss in German offices by 1990, although they later revised this to 25%.[45] 40% job loss is also the estimate of Philip Virgo, of the Conservative Political Centre.[46] APEX, the white-collar Trade Union, estimated in 1979, that a quarter of a million office jobs in

Britain would disappear by 1983 as a result of the introduction of office technology[47] but others believe that job loss will be comparatively low. Bird, for instance, estimated in 1980 that only 2% of office jobs would be displaced by 1985, rising to 17% by 1990.[48]

Applying these predictions to West Yorkshire gives us a range of possible loss of between 2,000 and 40,000 clerical jobs in the next three to five years, a loss which would increase as the decade unfolds.

The investigator attempting to narrow this range of possibility and arrive at a more precise estimate of clerical job loss in the county is faced with two questions: how rapidly is the new technology being introduced? And what proportion of jobs is lost when it is introduced?

The factors encouraging the rapid introduction of new technology into offices are too well-known to document here: the low level of capitalisation in offices; the cheapness of the technology; the low productivity of clerical workers compared with production workers; the soaring costs of office overheads; the declining profitability of many firms, leading them to seek rationalisation; all these have been amply described in most of the literature on the subject. A subject which has received rather less discussion has been the factors likely to discourage a speedy introduction of new technology into all the areas where it could potentially be applied. Several commentators mention the conservatism of many British managers as an inhibiting factor, and some, such as Barron and Curnow[49] also point out that the reluctance of managers to give up the status of having their own personal secretary, and the wide distribution of secretaries in separate offices within an organisation will add to this reluctance to change in many cases.

McLean and Rush, of the Science Policy Research Unit, suggest several other barriers to the new technology. The first of these is the way in which word-processors have been marketed. They consider that had the manufacturers adopted a policy of leasing, on the model of that used by Xerox in marketing photocopying equipment, diffusion would have been much more rapid. They also point out that electronic information systems present a number of problems connected with the legality and security of business information and correspondence which at present require certain documents to be on paper, and that the need to keep parallel, paper-based systems going is a deterrent to potential users. Finally, they mention the importance of the G.P.O.'s monopoly over means of electronic communication between offices in this country, and suggest that this creates an effective barrier to widespread adoption of electronic office systems, since it is in the area of inter-office communication that new technology has demonstrated some of the greatest advances in overall efficiency in the United States, where standards for interfacing between machines are much less stringent, and the telecommunications network is organisationally separate from the postal system.[50] The report and recommendations of the National Committee on Computer Networks[51] suggest, however, that this last obstacle is one which the government is concerned to clear, and will be effectively removed in the near future.

To these should be added a further factor: the effect of trade union resistance. McNally[52] has shown that women clerical workers are as likely to be militant as their male colleagues and that a substantial proportion (well over a third in 1974 and probably considerably more now) are members of trade unions, so this is not a negligible factor.

The complexity of the interplay of factors governing the rate of introduction of new technology is illustrated by one example.

A white-collar shop steward in a branch office of a large multinational company informed the author that, despite an agreement between union and management that no new technology would be introduced until negotiation over the terms of introduction was completed, individual managers and heads of department had been purchasing word processors and desk-top computers out of departmental budgets without central authorisation, because they regarded them as status symbols. The personal secretaries who were being asked to use them were nervous about upsetting their personal relationships with their individual bosses, so were reluctant to inform the union representatives who lacked the resources to 'police' their agreement by carrying out systematic checks in each of a large number of separate offices.

This suggests that some of the factors suggested earlier as barriers to the introduction of new technology, such as the isolation of individual secretaries within firms, may in fact act more as barriers to effective union organisation, and speed up piecemeal small-scale introduction.

One indicator of the extent to which employers perceive the advantages of new technology as outweighing the disadvantages comes from a computing survey quoted by APEX[53] which 'revealed that more than two thirds of private sector employers planned to increase the money invested in computing, despite the rapid drop in costs of equipment. A primary reason was to cut labour costs. Companies estimated that, for every £1 spent on data processing alone, £2.60 was saved in clerical and other costs.'

The evidence for job loss as a result of the introduction of new technology comes, inevitably, from case-studies of particular workplaces. However,

these effects vary considerably depending on the type of work involved, the existing organisation of work, the time-span over which job loss is measured and the size of the organisation concerned.

Bird looked at nine cases in 1978-1979 to study the effects of text-processing technology. In only three of the nine cases was there any job loss, but in two of these it was 50%, 22 out of 44 in one case, and 6 out of 12 in another. In the third, twenty jobs out of 300 were lost. In the cases where there was no job loss there was a substantial improvement in productivity, except in two cases. In both of these, the introduction was very small-scale (in one case, one word-processor, and in the other, two) and in both of these cases there were problems with faulty equipment.[54]

APEX quotes several other examples: a nationalised industry office where staffing was reduced from twenty to fourteen; a management consultancy where staff were reduced from eighty to thirty-nine, despite a 25% increase in workload;[55] an electricity board office where typing staff were reduced from twenty-two to fourteen within six months on the introduction of a shared logic word-processing system; and a travel company where the number of typists was reduced from thirty to eleven. The job loss in this group of examples averages out at around 50%, though APEX are careful not to draw simplistic conclusions from this.

Counter Information Services provide a similar list of cases: a thirty per cent reduction in staff at the British Standards Institution with the introduction of ten word-processors; a reduction from 27 to seventeen full-time and from thirteen to three part-time typists at the Provident Financial Group when three memory typewriters were introduced into a central typing pool; another electricity board office where staff were reduced from over fifty to twenty-six.[56] In a local example, Bradford Council

reduced staff in the architect's department at Jacob's Well from forty-four to twenty-two with the introduction of nine word-processors in 1977, with an estimated 19% increase in productivity.[57]

Increases in productivity are perhaps as important as actual job losses when it comes to estimating likely job prospects in the future, and here dramatic examples are also quoted.

The Halifax Building Society managed to treble the workload with no change in staffing when it progressed from automatic typewriters to word-processors.[58] A major motor vehicle manufacturer, after a six month trial in three separate locations, reported productivity improvements ranging from 50% for general correspondence to 450% for standard letters, with an overall average of 243%.[59] Bird's nine case-studies produced five cases where data on changes in productivity was disclosed: these were improvements of 47%, 7%, 100% and 138%. In only one case (the single word-processor which went wrong) was there a decrease in productivity.[60]

Attempts to measure technology-related job loss and productivity in particular instances are, however, riddled with problems. In many offices there is no systematic measurement of productivity, making it impossible to quantify changes. It can also be difficult to distinguish job losses directly caused by the introduction of new technology from those caused by other factors, such as declining markets, changes in work organisation, non-replacement policies introduced because of public spending cuts or declining profitability, or relocation. The introduction of new technology is frequently accompanied by other changes in office organisation.

Another problem for the researcher is defining the group of workers to be studied, a problem which can best be illustrated by a hypothetical example: if a

company employing 250 clerical workers in all introduced word-processors into a typing pool of fifty, thereby reducing the typing pool staff to twenty-five, should this be defined as a 50% reduction of typing pool staff to or a 10% reduction of all clerical staff? A study which limited itself to the typing pool group would not only be likely to draw conclusions which overstated the job loss effects but might also be ignoring other significant secondary effects on numbers of employees (e.g. a more efficient typing pool might result in less typing being done in individual departments, and consequent staff reductions elsewhere in the company). On the other hand, a study of the whole clerical staff of the firm would run the risk of understating the problem. Introduction of new technology in the typing pool could be just a 'trial run' for widespread introduction elsewhere in the company, the full employment effects of which would not become apparent during the course of the study.

2. SALES AND DISTRIBUTION WORKERS

This is another area where it is generally considered that new technology will be widely applied, and bring about considerable changes in employment.

The Department of Employment, in 1979, forecast that the introduction of electronic cash registers, automatic stock-taking, etc., would not have the same direct job-destroying effects in Britain as had taken place in the United States, where the introduction of new technology accounted for a 20% reduction in retailing staff. However, 15% of clerical support jobs were at risk. It was predicted that the main effects would be indirect ones, contributing to continuing job loss among small retailers. An increase in direct selling was also predicted. If direct debiting became widespread, as a result of the

introduction of electronic funds transfer, cash-handling jobs would be eliminated which could lead to further job loss.[61]

Other commentators believe that the effects will be both more immediate and more drastic. Jenkins and Sherman estimate that the 2,657,100 workers presently employed in distributive trades in the United Kingdom will be reduced in the short term to 2,550,000, in the medium term to 2,000,000 and in the long term to 1,600,000, a 40% decline overall.[62] In a special report on retailing, the Financial Times, in November, 1979, commented on the surprisingly fast take-up of electronic checkouts with laser-scanning by large chain-stores. Several large groups, such as Tesco, Sainsbury, British Home Stores and International Stores were planning to launch operational systems early in 1980, and it was estimated that their use would be widespread within two to three years.

It is likely that the severe drop in profits among retailers during the early part of 1980, due to a sharp decline in consumer spending, has added urgency to the need to rationalise operating costs, of which labour costs are a major component. Some evidence for this view was supplied by Mr. Donald Harris, Tesco's director in charge of computers and administration, when he announced Tesco's plans to invest up to £90 million over the next decade in the introduction of computerised checkouts, stating that this would lead to staff reductions. He concluded that 'the overall impact of new electronic technology would be greater than the effect of high inflation and the intense High Street competition of the past few years'.[63] The speed at which laser-scanning can effectively be introduced into supermarkets partly depends on the speed with which manufacturers are prepared to print bar codes on their products. The Financial Times, in April 1980, quoted trade estimates that 70% of all grocery products would be

coded by the end of 1980, indicating very rapid spread.

Jobs in supermarkets are not the only ones at risk in sales and distribution as a consequence of the introduction of new technology. Automatic stock-keeping can also affect warehouse and accounting staff. Data-logging, whereby ordering can be done directly over a telephone link to a computer, using a small, portable, hand-held terminal rather like a pocket calculator, also affects order and invoice clerks, both in purchasing and selling organisations. One example of this is the system introduced by UniChem, the pharmaceutical wholesale organisation, which bought several hundred of these hand-held terminals in 1978 for use by the retail chemists whom they supply. Using the system, the pharmacist can simply walk round the shop, tapping in the code numbers and required quantities of products which need replacing. The device can then be connected to UniChem's head office computer by plugging it into a telephone and dialling the number. A two hundred-line order takes less than two minutes to transmit, which can be done at any time of day. Data-logging can also be used by field sales representatives for manufacturing companies, and has already been adopted for this purpose by at least one West Yorkshire-based company, a games manufacturer. This has the potential of increasing the productivity of sales representatives and thereby potentially reducing their numbers, as well as eliminating the jobs of clerical support staff.

Direct ordering of goods from home-based terminals could also have a major effect on sales jobs. Already in the United Kingdom, the Prestel system allows subscribers to place orders automatically with mail-order houses which place catalogues in the directory. This implies an expansion of mail-order at the expense of retailing, a trend which could further accelerate the decline of a small shop, and

with it the job opportunities which small shops have traditionally provided for women needing part-time employment near to the home.

A further application of new technology in the sales and distribution area lies in the automation of goods-handling. It has been suggested that this is an area where Britain lags behind its competitors, there being about eighty fully-automated warehouses in Britain, compared with 350 in West Germany and 1,600 in Japan. The authors of the Department of Employment report comment that 'the employment consequences of introducing such systems are inevitably negative', citing an instance in Japan where staffing was reduced from 20-25 to four in an automatic warehouse.[64]

3. 'SERVICE' WORKERS

'Service' workers, as can be seen from Table 1 (Appendix II) are the second largest group of women workers in the county. Like clerical workers, they are spread across virtually all sectors of industry, but unlike their counterparts in information-handling jobs, they have not been identified in the literature on the subject as a group likely to be affected significantly by the introduction of new technology. In fact, there are a number of applications of new technology which could directly affect employment in this category, but it seems most likely that the major effects will be indirect ones.

Cooking, preparing and serving food are occupations which can be directly displaced by automation. The past few years have seen a rapid growth in 'fast food' outlets in the United Kingdom, made possible by the introduction of computer control of timing and temperature in the cooking process. The expansion of the fast food industry will create some new unskilled jobs, but these are likely to be more than counterbalanced by the loss of jobs in the more

labour-intensive traditional cafes which are likely to be displaced as a result of competition. Similar technology, combined with infra-red cooking for rapid-reheating of food, has the potential for displacing labour elsewhere where cooking and food preparation are carried out on a large scale, e.g. school meals services, hospitals, hotels, works canteens. Electronic technology combined with sensoring devices also makes possible an increasingly sophisticated range of dispensing devices, such as drinks dispensers, likely to lead to an increasing use of self-service machines, at the expense of 'service' labour.

Cleaning tasks are also capable of automation. One robot, developed for the domestic market, was described in the Guardian in 1978. It cost about £2,000 and was capable of scrubbing, sweeping, polishing and vacuum-cleaning. Furthermore, it was available 'complete with a skirt, made small so as not to be intimidating'.[65] Although the technology exists for automating a large proportion of cleaning tasks, it seems unlikely that major industrial applications will be developed extensively in the near future. Cleaning represents a comparatively small proportion of the total labour costs of most organisations, so there is little incentive to invest in this area. It is likely, however, that domestic cleaning as an occupation will decline further, along with other domestic service, as more and more microprocessor-controlled labour-saving devices penetrate the domestic market. The Economist Intelligence Unit estimates that domestic appliances will be one of the fastest-growing areas for microprocessor applications, predicting, for instance, that penetration of the United States' cooker market by microelectronics would grow from 1% in 1978 to 15% in 1980 and 30% by 1985.[66]

Developments in electronic smoke-detection and security systems may have adverse effects on the employment of caretakers and security guards. The Six Countries group predicted that microelectronics will lead to an increase in self-service as a general trend in consumer services, and this is likely, indirectly, to reduce the need for 'service' employment overall.

Other indirect effects on 'service' employment arise as a consequence of effects of new technology in other industries. For instance, fewer office employees will lead to smaller offices and fewer office cleaning jobs; miniaturisation of components and the substitution of electronic for mechanical machinery could lead to smaller, cleaner factories, also reducing the requirement for cleaning.

4. SCIENTIFIC AND TECHNICAL WORKERS

Only about 3,500 women in West Yorkshire are employed in scientific and technical occupations, as Table 1 shows. However, this appears to be the main area where the introduction of new technology creates new jobs. Case studies already examined indicate that a number of new jobs connected with data processing and systems analysis have already been generated, and it is likely that further jobs will be created in research and development as new applications for microprocessors and related technology are developed.

Bird suggests that additional technical jobs in work measurement ('O and M') will also be created by the introduction of new technology into offices, at least in the short-term, while organisations are in the process of changing over to new systems and evaluating their effectiveness.[67]

It is thus possible that new technology may create new opportunities for women workers in the scientific and technical field.

A survey of the Manpower Services Commission in 1978 uncovered serious skill shortages in electronics engineering and software design, which is exacerbated by a shortage of teachers in electronics engineering, computer science and information technology. A detailed study of shortages in computer-related jobs was carried out by the Manpower Subcommittee of the NEDC Electronic Computers Sector Working Party, which reported in 1980 that:

> Among computer users, at least 235,000 skilled computing staff were employed in early 1979. Established users claimed to be 8% (21,000 jobs) below establishment levels. At the professional level (programmers, analysts, etc.) the shortfall was 16%. The working party estimated that computer users would require additional skilled computer-related staff at the rate of 500 more people per month until the end of 1985.
>
> In computer services, a sector expanding at the rate of 20% per annum, it was estimated that a minimum of 24,000 skilled computer-related staff were employed, of whom 70% were on professional grades. Overall, shortages were estimated at 10%, but this was higher in the professional grades. It was estimated that skilled employment in the sector would double between 1979 and 1985.
>
> Among computer manufacturers, approximately 10,000 skilled computer-related workers were employed on hardware, and 5,000 in software in 1979. Shortages were as high as 20% in some occupations. Employment was expected to grow by 3% per annum. There was also considered to be a shortage of skilled computer-related staff in the electronics industry. In general, the most marked shortages were of professional electronics engineers, electronics technicians, control engineers and production engineers.68

An examination of the data on training in science and technology and computer-related education suggests that substantially fewer women than men are being trained to equip them for these jobs. Only 9% of trainees in science and technology were women, an exact reversal of the situation in clerical and commercial subjects, where women form 91% of students. In craft skills, which include some computer-related practical courses, women were even less well-represented, forming only 1% of students completing training.

Turning to computer education, the 'O' and 'A' level courses which provide the foundation for acquiring professional-level qualifications, we find that women are under-represented here too. The figures seem to indicate a slight upward trend in the proportion of girls being entered for examination in these subjects. They increased from 26% to 27% of the total number of entrants at 'O' level, and from 21% to 23% at 'A' level. In order to see whether this trend was continuing, figures for 1979 and 1980 were sought. The only ones available at the time of writing were those for the London Examining Board's 'A' level in computer science. In 1980, 454 boys and 105 girls were entered for this examination, a total of which girls form 27%. This would seem to indicate that a higher proportion of girls is being educated in computer studies, although boys still form the majority of examinees.

Aware of the under-representation of women on technology-based training courses, and of the chronic labour shortage in these areas, the Manpower Services Commission and the Engineering Industries Training Board have set up experimental courses for women in mechanical engineering and electrical engineering. The experience of running it has led the Manpower Services Commission to examine some of the factors which make it difficult for women to enter these fields.

'There seem to be more problems in the firms in which the girls get their practical training than in the training centres or colleges. This is because of the fairly common prejudice against girl trainees shown by long-experience supervisors. Also, while some employers are willing to take girls and even become enthusiastic when the girls show that they can do the work, other employers apparently will not contemplate such a change in their apprenticeship schemes. The Nottingham researchers have recognised another possible long-term weakness of the E.I.T.B. scheme which is that an employer may be persuaded to train girl technicians but may not consider them in career terms. Thus they may have no ideas about how to retain, and retrain as necessary, women technicians who have to break their career at different times for family reasons.'69

5. OTHER SERVICE EMPLOYMENT

Section 3 of this report covered those service occupations which spread across all or most industries. There are however some occupations which are peculiar to one industry or which deserve separate attention because of the particular characteristics of specific industries. Below, the major likely effects of new technology in these areas are outlined:

Banking, Insurance and Finance

This is a sector in which major job loss as a result of new technology has been predicted. The Nora/Minc report estimated this at 30%.[70] Jenkins and Sherman go even further, predicting a decline in employment of over 40% in the long term.[71]

The history of employment in this sector is one of steady expansion. In West Yorkshire it employed only 1% of women in 1921 (2% nationally), a proportion which grew to 4% by 1971 (6% nationally). Staff employed nationally by the London Clearing Banks grew from 85,000 in 1949 to 206,300 in 1974, with women forming a substantial part of the increase. Between the same two dates women increased from 29% to 57% of the work force: they were mainly concentrated in clerical jobs.[72]

The volume of business is still growing rapidly. Between 1970 and 1978 the clearing banks doubled their transactions. One bank now clears two million cheques a day, against 350,000 in the 1960s. There is room for still further expansion, since only 45% of the population in Britain have bank accounts, a proportion which could increase to 90% by 1990 if forecasts are correct.

Despite this growth in business, however, the upward trend in employment began to go into reverse in the mid-70s, together with the trend towards increased employment of women. Between 1974 and 1976 the number of women employed by the London Clearing Banks dropped by 4,800 while the number of men increased by 2,200. It is likely that new technology accounted for a substantial part of this increased productivity. Technological innovation is nothing new in the banking industry. Banks were among the first commercial organisations to make extensive use of main-frame computers in the late 1950s, since when there has been a series of new applications of computer and other technological advances, often accompanied by organisational changes. Some of these are listed below:

i The introduction of 'plastic money' or credit cards, cutting down on the labour involved in processing cheques.

ii A variety of increasingly sophisticated types of cash-dispensing machines, which enable customer self-service to replace cashiers.

iii Automatic provision of bank-balance information. These customer-operated machines, triggered by the 'cashpoint' card, provided immediate information on the current state of the user's bank-balance. They could potentially eliminate the need for bank statements, and the associated clerical labour and postage costs.

iv Word-processors, which reduce the requirements for typing staff.

v 'Satellite banking' or reorganisation of branch structure involving centralisation of many functions traditionally carried out separately in each branch, reducing smaller branches to 'satellites' of a regional main office. The Midland Bank is committed to rationalising 37% of its branches in this way by 1982. The economies of scale made possible by new technology have accelerated this development, which has implications both for numbers of jobs and for career progression.

vi Cashier-operated 'intelligent' counter terminals which can handle a variety of functions from recording transactions and calculating interest to the printing of passbooks, ledger cards, etc. While these do not necessarily displace cashier jobs at the branch where they were used, they can eliminate jobs elsewhere in the organisation. They also have the potential for being used on the other side of the counter directly by the customers.

vii Automatic security systems, already reducing the numbers of security staff employed.

viii Lobby banking, the introduction of completely unstaffed banks in which cash can be obtained from machines and cheques deposited. A prototype was opened by Lloyds in Luton in 1979.

ix The use of Optical Character Reading (OCR) technology for cheque recognition and processing, currently being investigated jointly by Midland Bank and the Burroughs Corporation. This would enable the information contained on a cheque to be transferred electronically without the costly and labour-intensive process of physically transferring the paper.

x Electronic Fund Transfer, enabling direct linkage to be made with shops, so that customers can have payment directly deducted from their accounts, without money or cheques changing hands. A full-time project team is currently working on the details of how such a system can be set up, having already established its feasibility. Involved in the project are the Bank of England, Barclays, Lloyds, Midland, National Westminster, William and Glynns, Bank of Scotland, Royal Bank of Scotland, Clydesdale, Co-operative, Central Trustees Savings, Access and Barclaycard. This development has implications for employment in retailing as well as in banks.

xi The 'pocket bank', a credit card with a microchip embedded in it, carrying details of the cardholder's total amount of credit, from which deductions are made with each purchase until the credit is exhausted. The card is then thrown away. A prototype, developed by Cii-Honeywell Bull can cope with more than a hundred transactions.

Besides affecting numbers of jobs, promotion prospects and skill requirements, it is likely that the increasing automation of banking will increase

the requirements for round-the-clock, seven-day shift working, already a necessity for the computer operators and support staff required to keep through-the-wall cash dispensers on-line twenty-four hours. This has serious implications for equal opportunities, since many women are restricted in the hours they can work by their family commitments.

Banking is not the only industry in this sector likely to be affected by the introduction of new technology.

The insurance industry is a labour-intensive industry with a high proportion (45%) of female employees. Like banking, it has expanded considerably in recent decades, with the number of transactions doubling between 1959 and 1978, although employment levels remained fairly stable during this period. Because of the large amount of standardised information and routine correspondence involved in insurance, it is an ideal candidate for the extensive adoption of word-processing. Another potentially labour-displacing application of new technology is the installation of visual display units in branch offices which can display for a customer all the options of a policy and its competitor in a matter of minutes. Such a system has already been installed by the U.K. Friends Provident Company, whose Managing Director says that it has cut manpower needs at both head office and branches.[73] Reviewing employment prospects in the insurance industry, The Department of Employment comments 'The vast majority of (women) still seem to be in low grade clerical and typing jobs and are undoubtedly the group most at risk should new technology lead to reductions in overall employment'.[74]

Education

The main application of new technology in education seem likely to be in administration and in 'service'

areas such as school meals. These have been covered above in the sections on Clerical and 'Service' work. While the content of some teachers' jobs may change, in order that their pupils can be educated for the micro-processor age, it appears probable that the main factors influencing employment levels and conditions in educational establishments will continue to be Government policy in relation to public spending at both local and national levels and demographic factors. There are likely to be increased opportunities for specialist teachers in science and technology subjects, and an increase in computer-assisted learning is forecast, together with an increase in the educational use of teletext systems such as Ceefax and Oracle.[75] Although most commentators on the social implications of new technology call for increased 'education for leisure' there seems little likelihood of this resulting in increased employment for teachers in the short term without a reversal of Government policies on public expenditure. The project uncovered no evidence to support the well-publicised view of Professor Tom Stonier that, by the first decade of the twenty-first century, the education sector will have expanded to the extent that it employs up to 90% of the working population.[76]

Health and Welfare

As with education, the greatest impact of new technology on employment in the short term is likely to be on clerical and administration staff in the fields of health and social services. The use of word-processors for standard correspondence and of mini-computers for medical record-keeping and other forms of information storage and retrieval are prominent examples of applications of microprocessor technology. These are covered in the section of this report on clerical work above. In a period of

financial stringency in the public sector, there are obvious incentives for applying these where they are likely to cut costs and improve productivity.

In medicine, there are many other applications, some of which have implications for employment. The famous medical history-taking machine, MICKIE, already in use in several hospitals, is one example. It is used to run through the routine part of a medical examination, with patients interfacing directly with the machine, reducing the doctor's time employed to that necessary for diagnosis and therapy. Besides increasing the productivity of doctors, this has other employment effects. The Central Policy Review Staff suggest that such a system could 'bring about a transfer of responsibility away from the junior hospital doctor, on the one hand, upwards to the specialists who compile the information and, on the other hand, sideways to the G.P. who may carry his own diagnosis further with the aid of it'.[77]

Microprocessors have found a wide variety of uses in medical equipment, some of which appear to have implications for employment of medical staff. One example of this is a haematology analyser developed for use in routine blood analysis in the United States. It was found to reduce very dramatically the level of skill required by users in hospital laboratories.

The Central Policy Review Staff considers that the full potential effects of such developments will not be felt by nurses and other hospital staff because public acceptability will slow down the rate of adoption: 'If a nurse controls twenty kidney machines instead of one or two, the change will immediately become apparent to the patient or his relatives and may influence their view of the quality of the service being provided. This will tend to slow down the rate at which innovations are introduced'.[78]

In the longer term, it is predicted that health and welfare may become fields of expanding employment as an indirect consequence of the widespread introduction of new technology. The International Labour Office speculated that 'Higher levels of unemployment, more leisure time and early retirement would create the need for social services to deal with possible increases in youth delinquency and divorce rates and, more importantly, to maintain the mental health of the population in countries in which it still relies to some extent on the work ethic as its standard of self-value'.[79]

Post and telecommunications workers

Telecommunications is the sector in which many of the most publicised technological developments are being applied, such as Sytem X for automatic telephone switching; Viewdata, Ceefax, Oracle and other types of electronic information systems; packet switching systems so that computers and word-processors in different parts of the country can communicate with each other; and electronic mail. The development of optical fibre technology has enabled these developments to be planned at lower cost and greater efficiency than would have been conceivable using traditional wiring systems.

Opinions vary as to whether the introduction of these systems will bring about an overall net loss of jobs in telecommunications, although it is generally accepted that they will bring about considerable change in the levels of skill and knowledge required. The Post Office believes that new jobs created by the growth of the system will compensate for jobs lost through automation, a view with which the Department of Employment concurs. However, there does seem to be some evidence that the main growth will be in the types of jobs traditionally done by men, such as installation and maintenance engineers,

while the occupations in which women are concentrated, telephonists and clerical staff, will be the most vulnerable. The International Labour Organisation which undertook a major international study of the effects of technological change on employment in posts and telecommunications came to the conclusion that, although overall employment levels remained fairly stable, because job loss among some sectors was compensated for by increases in others, the groups most likely to lose their jobs were auxiliary and non-established staff (mainly women); clerical staff (also mainly women); workers unable to accept transfer to another part of the country (women with family commitments were more constrained than men in accepting transfers); and workers unable to change to continuous shift working (also more likely to be women than men).[80]

In Britain, women workers in telecommunications are most likely to be clerical workers or telephonists, both of which groups are vulnerable to the effects of new technology; clerical workers are affected by word-processing and other office technology developments in the same way as other clerical workers (see above). Telephonists' employment prospects are also affected by the increasing automation of exchanges. One type of automatic call recording equipment (ACRE) alone tried out by the Post Office in Eastbourne in 1979 cut 20% off the time of operator-connected calls, and, according to the GPO, could reduce the number of operators in Britain by 1,500 if introduced nationally.

Even more dramatic productivity increases resulted from the trial run carried out in Leeds in 1978 of a computerised system for directory enquiry retrieval. Time taken on each enquiry was reduced from an average of fifty-three seconds to only twenty seconds - a reduction of over 60% of operator time, which could have important consequences for employment in this field.

The postal service is expected to suffer significant job loss as a result of declining traffic due to computerisation, the development of electronic mail and continuing and increasing competition from telecommunications. The Department of Employment estimates this at 10-15% over the next decade, commenting that the 'fall in the number of clerical and counter staff will be balanced by a rise in other grades, particularly engineers'[81] showing that, as in telecommunications, it is the jobs presently done by women which will disappear.

Other public sector employment

It is peculiarly difficult to predict employment trends in the public sector, dependent as they are on Government policy rather than market forces. Present plans for a sustained reduction in public expenditure of 3.5% from 1980-81 to 1983-84 suggest that public authorities will be seeking ways in which productivity can be improved in order to maintain services within constricted budgets. The low capital cost of much microprocessor-based equipment combined with its capability of increasing productivity is likely to make it attractive to many national and local government organisations. Already, by 1978, over a hundred local authorities had adopted word-processors or some other form of automatic typing equipment[82] and it seems probable that by now this number has increased considerably. Applications are not restricted to local government, and, in the recent past, several national state agencies have made plans to adopt new computer-based systems which have far-reaching implications for employment in this sector.

The Inland Revenue, for instance, after a successful pilot scheme in Liverpool, has embarked on a major programme of computerisation, expected to lead to the automatic handling of the tax assessments of all

twenty-four million PAYE taxpayers by 1986-87. The Inland Revenue Staff Federation estimates that this will mean the loss nationally of 8,000 clerical assistants' jobs (11% of all Inland Revenue employees) and an as yet unquantified number of tax officers' jobs, and that it may pave the way for further changes meaning even greater job loss in the future, opening up the possibility of direct linkages between the computer systems of the Inland Revenue, banks and private employers. Since one of the four national Inland Revenue Collection Centres is based at Bradford, this development is likely to make a significant impact on employment opportunities for office workers in the area.

In general, it is clerical work which is most likely to be seriously affected by such developments, and this is covered in more detail earlier in this report.

6. EMPLOYMENT IN MANUFACTURING INDUSTRIES

In West Yorkshire, the manufacturing sector is unlike the service sector in that introduction of new technology is taking place against a background of long-term decline, a downward movement which has accelerated in the post-war period. As a source of employment for women, the manufacturing industry declined from providing 61% in 1901 to 51% in 1951, falling to 34% of women's employment in the area by 1971. As we have seen, the proportion of women actually engaged in production is even lower than this, estimated at only 25% of total women's employment (around 80,000 jobs) in 1977.

This background of general decline makes it difficult to distinguish many of the indirect effects of the introduction of new technology from negative changes in employment caused by other factors, unrelated to technological developments. There are, however, a

number of applications of new technology which can directly effect employment levels in manufacturing, some of which are summarised below:

i) Numerically controlled machine tools - The incorporation of reprogrammable micro-processors has greatly decreased the cost and increased the flexibility of these tools, which can reduce both labour and skill requirements. This mainly affects skilled craft jobs in engineering.

ii) Computerised process monitoring and control - The introduction of micro-processors combined with sensitive sensoring techniques has greatly increased the number of applications of automatic techniques for monitoring and controlling industrial processes. One example of this is the electronic 'dairymaid's thumb', a machine developed to monitor the rigidity of curd in cheese-making, previously a process which had to be continuously monitored by an operator. This is now done automatically by electrical signals from a transducer.

iii) Mechanical assembly - An example of this is a programmable system designed by IBM which consists of a computer-controlled arm and gripping mechanism equipped with sensors, plus software to direct its movements. It is capable of assembling a wide range of products from blenders and toasters to typewriters, staplers and keyboards. It can put together an eight-part typewriter sub-assembly in forty-five seconds.[83] Mechanical assembly systems clearly have major implications for the employment of assembly workers.

iv) Robots - The mechanical assembler described above is a form of robot, but robotics are capable of wider applications than just assembly, enabling a direct substitution of

> machine for human in a wide range of activities which require repetitive movement, such as paintspraying and welding. Reprogrammable software and increasingly sophisticated sensoring devices have expanded the range of applications, while the falling cost and easy replaceability of microprocessor components has made robots more attractive to potential users. One example of this is the use of robots in sorting and packing. In the confectionery manufacturing industry for instance, the introduction of robots is already under way. Cadbury's plan to reduce employment in their Bourneville factory in Birmingham from its present level of 6,000 to 1,000 in ten years' time with the help of robots, and Rowntree-Mackintosh, a local employer, has begun a feasibility study on the use of 160 Puma robots for sorting and packing chocolates.[84]

Apart from the direct displacement of labour by machines exemplified by such applications, there are a number of ways in which the introduction of new technology can indirectly affect employment in manufacturing. For instance, the development of new micro-processor-based components can make traditional components obsolescent and hence displace labour from the areas where they are produced; the reduction in size and numbers of components not only reduce the amount of labour required for assembly but also has a 'knock-on effect' on associated jobs, since there are fewer parts to move, pack, store, etc.; companies which fail to innovate may decline or be forced out of business by loss of markets due to competition from more highly automated firms.

Textiles

The manufacturers of wool textiles has traditionally provided employment for a large proportion of West

Yorkshire's working women. In 1901,39% were employed in this industry, a proportion which fell steadily until by 1971 it was 9%, reflecting the general decline of the industry. Since then, the wool textiles industry has continued to decline at an ever-increasing rate. Between 1973 and 1979 the output of the industry fell by 31%, a fall reflected in employment in the industry, which also fell by 31% during the same period. The Dyers and Bleachers Union estimated that in February, 1980, 7,000 wool textile workers were covered by short-time working schemes and that 900 jobs disappeared in the industry in West Yorkshire in March alone.[85]

Women are losing their jobs slightly faster than men in the industry, decreasing as a percentage of all production workers from 46% in 1971 to 43.5% in 1978.[86] It is against this background that the introduction of new technology in the industry must be set.

Micro-processors have potential applications in virtually every process in textile manufacture, from computer-aided design at the beginning of the process to micro-processor control of dyeing and finishing processes at the end. With computer-controlled dyeing, for example, only 10% of the batches need a second dyeing, compared with an average of three dyes using traditional technology. All the occupations in the wool textile industry in which most women workers are concentrated could be affected if current technological possibilities are applied in the industry.

Fibre preparers, of whom there were over 2,000 in 1977, include carders, whose jobs may be affected by micro-processor-based 'slub' control of quality and consistency, and combers, who may be similarly affected by micro-processor control of combing machines which speeds up production by reducing faults.

Spinners and twisters, estimated at 5,000, also face the possibility of a bewildering range of process control applications of micro-processors to their jobs, including on-line monitoring of the quality of twisted yarn, control of gill boxes, optimisation of spinning frames, control of lap at scutcher, auto-levellers and monitoring of open-ended spinning. Minders and reelers, one of the largest groups of women in the industry, an estimated 6,500, may see their jobs becoming increasingly highly automated, with a reduction in skill requirement.

Warpers, of whom there were estimated to be 1,750 in 1977, may be affected by 'intelligent' knotting creels; automatic cone winders; sucker sizing machines; warp drawing machines and warp tying machines.

Weavers, a larger group comprising nearly 5,000 women in 1977, may see the introduction of electronic sensors monitoring fault detection in the fabric at the loom; electronic devices for fast and efficient fault-finding and maintenance; electronic pattern control looms, and possibly even electronic control of the actual weaving process. It has been predicted that this could lead to a complete centralised mill-monitoring system, with one operative controlling up to 120 looms. If linked up with computer-aided design it could bring completely automatic production.

'Textile fabrics and related products makers and examiners n.e.c.' is the largest occupational category for women in the West Yorkshire textile industry, nearly 9,000 in all. A large proportion of the women classified here are employed in burling and mending, jobs which are likely to diminish in number as the quality and uniformity of the yarn is improved at earlier stages in the process as a result of automation and computer monitoring . 'Textile fabrics, etc., production process workers n.e.c.', a

category which contained just over 1,500 women in 1977, includes the less skilled labouring jobs, many of them acting as assistants to workers in other occupational categories. Declining employment in these other occupations would be reflected in fewer jobs in this category as well.

These developments, if introduced, would be likely to lead to an increase in the existing trend towards twenty-four hour working in the textiles industry, considered to be a major reason for the proportionately greater job loss among women referred to above. This could only reduce women's opportunities still further.

Clothing

Like the textiles industry, the clothing industry has long been in decline in West Yorkshire. Although it provided 15% of women's employment in West Yorkshire at the beginning of the century, by 1971 it provided only 9%. However, this is still a considerably higher proportion of women's employment than in the rest of the country, where on average, only 3% of women work in this sector. Much of the employment in the clothing industry is concentrated in relatively small firms - in 1979 there were only four clothing manufacturing companies in the county with over five hundred employees.

According to some predictions, the clothing industry stands to gain from new technology. In 1978, the Government's 'Think Tank' had this to say:

> 'In the clothing industry, where the major effects (of micro-processor technology) will be better quality and product standardisation as well as improvements in the efficiency of production and management methods, the effects on labour are expected to be minimal. This particular industry illustrates the opportunity

> presented by microelectronics. At a time when the industry is under pressure from both the high quality goods of developed countries and from low cost garments produced with cheap labour in the developing countries, microelectronics could provide improvements which will enable the U.K. clothing industry to remain competitive and hence maintain employment, as long as U.K. industry innovates ahead of its competitors.'[87]

The argument appears to be that any job loss caused by the introduction of new technology will be compensated for expansion resulting from increased market share. So far, the project has been unable to discover any evidence that the decline in employment in this industry has been halted. However, there is some evidence that new technology is being introduced.

The main micro-processor-based development which seems to be being introduced is computerised cutting. Hepworth's, one of the few large clothing manufacturers in the area, has introduced a computerised cutting system which relies for its effectiveness on the fact that the company is also a large retailing concern, with an existing network of computer linkages between the retailing outlets and the company's head office. The new system is designed for bespoke suit-making and allows for customers' individual measurements to be fed into a central computer directly from the shops. The basic pattern, consisting of some twenty-five parts, is then automatically adjusted to the individual measurements and presented on a VDU for checking. A life-sized paper pattern is then automatically traced out. The system, which is claimed to have improved productivity on made-to-measure suits by 250%, is operated by a team of six women, working two shifts. This is an example of new technology bringing about

the preconditions for women to be employed in an area which was traditionally a male preserve. However, the jobs are not as highly skilled as those they replaced, requiring only six weeks training. During the year which preceded the announcement of this new system, the company closed four factories and reduced employment by a fifth, with the loss of well over 700 largely female jobs. It seems unlikely that the overall effect on employment levels was anything other than a negative one.

Computerised cutting and pattern-grading is not restricted to bespoke tailoring, nor indeed to large companies. The Leeds-based Wool Industries Research Association (WIRA) has introduced a service, supplied to small firms on a fee-paid basis, which involves computerised calculation of pattern sizes and a subsequent computerised cutting operation. While this has created four or five new jobs at WIRA, it is likely that it has had adverse effects on the employment of manual pattern cutters in the clothing industry.

Cutters, however, represent a small proportion, about 12% of the total workforce in the clothing industry, and have, in the past, been almost exclusively male. The majority of the workers in the industry are women employed as machinists. From Table 8 it can be seen that in 1977 there were 21,000 women employed in machining or related clothing-making activities. To make a substantial impact on employment in the industry, any new technology would have to affect the machining process.

There have, in fact, been technical developments in this area, which make use of the programmability of the micro-processor to achieve their effect. As early as 1976, Singer introduced an industrial sewing machine, the Centurion, with a memory capable of storing, and repeating more than a hundred different sewing tasks at the touch of an illuminated control

panel. This machine can 'learn' a sewing task from a skilled operator going once through the process which would normally have to be repeated for each article produced. If widely adopted, such a machine would appear to have major implications both for employment levels and for the skills required of clothing workers. However, no evidence has so far emerged that it is being adopted, and sources in the industry are sceptical about the likelihood of its replacing traditional methods in the near future, giving both technical and economic reasons for their views. It is argued that a reduction in machining time is relatively unimportant compared with the time spent in handling fabric and positioning it ready to be machined, something for which no technological sustitute for human skill has yet been discovered; that the machine would not be able to 'ease' together two edges of fabric of slightly different lengths, as a skilled human operator can (however accurate the electronic cutting, fabric will continue to shrink and expand variably as a result of changes in temperature and humidity); and that many of the small firms which make up a large proportion of the industry in West Yorkshire are unlikely to be in a position to invest in new technology.

7. UNEMPLOYMENT

Any analysis of the likely effects of new technology on women's employment must take into account also the pattern of unemployment amongst women.

In the early 1980s, unemployment has risen sharply in West Yorkshire, from 5.4%, slightly below the national average of 6% in January 1979 to 9.0% in October 1980, above the national average of 8.4%.

As has already been mentioned, official unemployment statistics are a very unreliable guide to actual unemployment amongst women, since many women who are

not eligible for benefits have no incentive to register, although they may be seeking work. The statistics are even less reliable when it comes to vacancies, since there is no incentive for employers to register them in many cases, especially for occupations where there are established alternative methods of recruiting staff, such as private employment agencies and the classified columns of specialist trade journals.

Despite these limitations, it is instructive to examine the comparative distribution of unemloyed people and registered vacancies among occupations since a high ratio of unemployed people to vacancies does at least indicate that there is not a shortage of appropriately qualified labour in a particular occupation, except in the case of some types of seasonal work. A breakdown of unemployment by industry can also be a useful indicator of employment trends in the local economy.

Looking at the figures for women's unemployment, one feature which stands out is the relatively high proportion in manufacturing - 7,583, almost exactly the same as the total (7,790) for the service industries. Since manufacturing employs rather less than half the number of women employed in the service industries, this suggests that unemployment is much greater in manufacturing. It is possible that some of this difference could be accounted for by a tendency for women in service industries to 'sign on' less than those in manufacturing, but unlikely that this explanation could account for all of it. A more probable explanation is the continuing rapid decline of West Yorkshire's manufacturing industries, with large numbers of employees on short-time working. The particularly high numbers of unemployed women in textiles (2,234) and clothing (1,958) provide additional evidence to that in the last section of this report that these are both industries which are continuing to lose women's jobs. In many

occupations, the ratio of job-seekers to vacancy is extremely high, and several of these coincide with occupations identified earlier in this report as being at risk from the introduction of new technology. For repetitive assemblers, for instance, it is 48:1, considerably higher than the average of 34:1 for manual occupations as a whole; it is 15:1 for clerical staff, compared with an average of 13:1 for other non-manual occupations.

While there is insufficient evidence to draw any firm conclusions from this, these figures do confirm that there are fairly high concentrations of unemployed women and fairly low numbers of vacancies in certain occupations in West Yorkshire. Since, according to Department of Employment figures, (July 1981) job losses are proportionately higher among women, it seems likely that this mismatch between supply and demand for women's labour will grow.

8. JOB CREATION

As the unemployment figures quoted in the last section demonstrate, there is no evidence that net job creation is taking place in West Yorkshire at present. Rather, the picture is one of accelerating job loss.

Preliminary studies of the effects of new technology on various industries in the West Yorkshire economy in the earlier part of this report also seem to indicate that the overall effect of its introduction generally seems to be a decrease, rather than an increase in numbers of jobs. Although some new jobs in scientific and technical occupations are created in many cases, these appear to be much fewer in quantity than the jobs displaced from that industry as a result of increased productivity.

A look at the history of technological innovation suggests that this has been a fairly general pattern. Virtually all major technological developments have

resulted in dramatic job loss in the industries the activities of which they have automated. Examples of this are the effects of the internal combustion engine on the horse-drawn transport industry; the effect of the gramophone on the employment of music-hall singers, and so on. What has happened in each case has been the creation of new industries, in these cases the car industry, and record and record-player manufacture, bringing with them a host of other occupations, such as traffic wardens, launderette attendants and disc jockeys. From the point of view of someone examining the decline in the employment of ostlers, or the future of the stage-coach manufacturing industry, the job-creating effects of the new technology in other areas of the economy (in this case, the car industry) would have been largely invisible.

These somewhat overstated and unsubstantiated examples have been given to demonstrate the dangers of generalising about the effects of new technology from within existing industrial and occupational classifications.

Insofar as it is possible to draw out the 'lessons of history' with regard to job creation resulting from technological innovation, it seems that a process takes place whereby labour-intensive services are replaced by goods, which in turn give rise to the creation of new services, a process which has been described by Rada as 'materialisation'.[88] Thus 'service' work of looking after horses gives way to the 'manufacturing' work of building cars; as domestic service declines, the manufacture of domestic appliances increases. Rada argues that the present wave of technological innovation may be leading towards a 'materialisation' of a number of our present-day service industries, citing the education and health services as examples. If this tendency towards materialisation exists, then it is towards new manufacturing industries that we should

be looking as a source of new employment, and towards the content of existing services to discover the functions of the products which they will be making.

Another look at the same historical examples does, however, suggest a further pattern: employment created in the new manufacturing industries seems likely to be geographically much more concentrated than the diffused services which it replaces. The development of a burgeoning new car industry in Detroit would have brought little comfort to an out-of-work ostler in Aberdeen, even though his daughter might eventually get a job locally as a traffic warden.

What are the factors likely to encourage the development of new industries in an area? One school of thought holds that new jobs are most likely to be created by small firms [89] of which West Yorkshire has a fairly high proportion. However, as the West Yorkshire Structure Plan Report of Survey points out, 'significantly the six industries which nationally have experienced the greatest decline in the number of small firms are strongly represented in West Yorkshire.[90] This does not bode well for a reliance on small firms for the creation of new employment. It is possible that existing high-technology firms might provide an alternative growth-point for job creation. Here too, the county is fairly well-supplied. According to the County Council:

> 'West Yorkshire can boast many firms which are innovators in "high technology" and, very importantly, market leaders in their respective sectors. The record of their production achievements shows the huge reservoir of management, production and technical expertise which is available. Relevant applications include the development of numerically controlled advance machine tools, advanced

process control valves for continuous production processes, precision advanced measuring systems, high technology thermo-plastic bearing, and materials research for aerospace components. In the electronics field, the County is well represented by both local and national firms engaged in computer servicing and electronic components' production. A number of these firms have substantial experience of semi-conductor applications including electro-mechanical switches and control gear, solenoids, power and systems transformers, induction motors and electronic instruments. These examples clearly demonstrate that there is a high level of background skills and expertise available in the County to support the introduction of further high technology industries'.

Plans for a New Technology Park on the outskirts of Leeds may well succeed in their aim of attracting further 'sunrise' industries of this type to the area, but at the time of writing, it is too early to tell whether that will be the case.

CHAPTER FIVE

QUESTIONNAIRE ANALYSIS

This section analysises the responses to the questionnaire survey in some detail. Full details of the responses, e.g. the occupations of the respondents, the type of workplace, etc. are available from the TUCRIC office, if required.

Because of the wide range of occupations and workplaces involved in the survey, and because of the limitations already discussed in the chapter on methodolgy, it is impossible to fully summarise the results, or to make more than very tentative generalisations. Consequently the range of responses to each question is briefly detailed here. Full details of each case are to be found in Chapter Six of this report. A copy of the questionnaire itself is to be found at Appendix I.

Occupation

All respondents but one answered the question about occupation, and the replies showed a wide variety of different occupations, manual, clerical and technical and professional. The only substantial group with similar occupations were clerical workers, a reflection of the importance of clerical work as an occupation for women and the very large numbers of clerical workers in the local economy.

Industrial Sector

Under the heading 'employer's business', there was also a fairly wide variety of different areas, from both the service and manufacturing sectors. However, there were some notable omissions. Perhaps the most important of these, from the point of view of women's employment in the

area, were retailing, the health service, textiles and the clothing industry. With the exception of the health service, these are all areas where union organisation is relatively weak or almost non-existent, and thus unlikely to be reached by the distribution methods used for the questionnaire. In the health service, it is likely that the large and complex nature of hospitals, and the very wide range of different occupations and trade unions within them were deterrents to completing the questionnaire.

As was perhaps inevitable, the responses to the TUCRIC survey in the manufacturing sector reflect the degree of union organisation within particular industries rather than the numbers of women employed, or indeed the extent of automation in their industry. Thus there were no less than six responses from various sorts of engineering companies, one from a printers, one from a furniture manufacturers, two from the food industry, and not a single one from textiles or tailoring, the two largest employers of women in the county.

Trade Unions

As with the question on trade, all 39 respondents replied to this question, and again there was a fairly wide spread, with the white-collar unions BIFU (The Banking, Insurance and Finance Union) and ASTMS (The Association of Scientific, Technical and Managerial Staff) representing 17 of the respondents, 5 and 4 belonging to AUEW (The Amalgamated Union of Engineering Workers) and USDAW (The Union of Shop, Distributive and Allied Workers) respectively, and the rest spread more or less evenly between 8 white and blue collar unions.

In a substantial number of cases, only one trade union was involved in negotiations at the workplace, 16 of the respondents stating that theirs was the only union involved. In the 23 cases where there were other unions, these covered an even wider range than those of the 39 respondents.

Number of Employees in the Workplace

32 of the forty respondents answered the question asking how many employees, male and female, there were altogether in their workplace, and again the replies illustrated a fairly wide variety of different sizes of establishment, varying from the largest with over 4,000 workers to the smallest employing less than 10.

Jobs affected by New Technology

Twenty-one of the forty respondents answered the question on which jobs were affected by the new technology. For some this must have been a difficult question to answer, especially in cases where the new machines had not yet been installed, depending on speculative judgment for the accuracy of the information given. Nevertheless, only one respondent gave 'don't know' in reply to this question, with one other giving an indefinite response, saying that 'a lot' of male jobs were affected and 'more' female jobs were. In the majority of cases, more female jobs than male jobs were affected by the new technology, only three out of those respondents giving a higher figure for men's jobs than for women's in reply to this question. Given that 60% of workplaces in the sample employed more men than women, this figure, representing only 17%, is remarkably low, and would seem to give a clear indication that women's jobs are proportionately affected much more by new technology than are men's.

Respondents were also asked to give the type of work which was affected by the new technology. Here there was a marked preponderance of clerical jobs, with 18 of the 29 respondents saying that only clerical jobs would be affected; 3 saying that both manual and clerical jobs were at risk; 6 stating that only manual jobs were affected; and 2 giving scientific and technical types of job as those concerned. Thus, clerical workers were involved when automation took place in 20 out of 28 cases.

Employers' Policy on Staffing Levels

The next three questions were all concerned with the employment context in which the introduction of new technology was taking place. Respondents were asked whether their employer had a policy of natural wastage, whether there was a redundancy agreement in operation at the workplace and, if so, on what principles it worked. Overwhelmingly, the evidence was that automation was taking place against a background of declining employment. Only 5 of the 40 respondents could state that their employer did not have a policy of natural waste, with 11 'don't knows' and no less than 24 stating that a natural wastage policy was in operation. The numbers with a formal redundancy agreement were lower; 18, with 7 'don't knows' and 15 stating that no redundancy agreement was in operation. In a significant number of cases therefore job loss was taking place with no formal control or monitoring by the trade union, and probably with little or no compensation paid to those made redundant. To the question about what principle the redundancy agreement operated on, 10 respondents did not know. Several of the others gave more than one principle, suggesting a situation where a second principle was brought in if voluntary redundancy failed to produce enough volunteers. Ten respondents gave voluntary redundancy, 7 early retirement, 6 'last in, first out', and 6 'part-timers' first. Both of the latter two principles give cause for anxiety to those concerned about equal opportunities, since women are much more likely than men to be part-time workers and, because of their greater job mobility, are somewhat more likely to be 'last in' than men.

Source of Information about New Technology

33 out of 40 respondents answered this question, but in some cases more than one source of information was given.

It is interesting to note that in only a minority of cases, 14 out of 35, were workers informed of the

introduction of new technology by their management through union negotiating channels. In a further 11 cases they were informed by management through other channels. In the remainder of cases no information had been formally supplied by management whatsoever, and workers had been left to find out for themselves, or had been faced with a fait accompli. However, in no case had workers been left to find out through receiving a redundancy notice.

Workers' Response

32 of the 40 respondents answered the general question about their fellow-workers' response to the information that new technology was to be introduced. It is interesting to note that although in 15 of the cases, nearly half, workers were 'worried' at the prospect, in not a single case were they described as 'opposed to' the introduction of new technology. On the contrary, 6 workplaces reported the response 'in favour' and 2 described workers as 'pleased'. The majority, 17 out of the 32, reported the response as 'unconcerned' (Note: Several respondents gave more than one response, so total exceed the number of responses). There was no evidence whatsoever to suggest that the response of workers to the new technology was negative or 'Luddite'.

The next question was designed to discover whether there was a significant difference between trade unionists and non-trade union members. 28 of the 40 respondents replied to this question, only 6 stating that there was a difference in response. However, the 22 who said that there was no difference in response included those workplaces where there was a closed shop, suggesting that some respondents may have replied 'no' to this question because it was non-applicable, or because they were not aware of the attitude of non trade union members, rather than because they had perceived no difference. Where there was perceived to be a difference in response, trade unionists were felt to be both more concerned and more active than non-trade unionists.

Respondents were also asked whether there had been a different response from people doing different types of jobs. This question was answered by 22, of whom 7 said there was no difference in response, while 15 reported a difference. In general, the people most affected were most concerned, although there was one exception, where people in boring jobs felt that they would be improved. In 2 cases, older workers were described as particularly worried.

Union Action

Respondents were asked what action, if any, their trade union had taken in response to the introduction of new technology, and this was answered by 33 of the 40 respondents. In most cases more than one form of action had been taken, so totals are in excess of the number of replies. The action for the most part consisted of meetings with management and/or members and/or full-time officials. A substantial number of unions conducted some kind of research and/or produced literature for their members.

Where industrial action was taken, this took the form of blacking the new technology until agreement had been reached as to how it was to be used. 'Other action' took the form of, in one case, asking for information from employees, and in a second sending members on training courses. In a third, written assurances were obtained covering health and safety. In general, the picture presented by these replies is one of peaceful negotiation, in which militant action is the exception rather than the rule, and complete inaction on the part of the union is not unusual. The questionnaire also included a question on whether the union had sought an agreement with the management over the introduction of the new technology, and this was answered by 32 respondents. Of these, 6 said that no agreement had been sought, 4 didn't know, and 22 said that such an agreement had been sought.

However, to the question whether such an agreement had been reached, only 4 out of these 22 could answer in the affirmative, while 5 didn't know and 15 said that no agreement had been reached. Even allowing for the fact that some of these agreements may have been in the process of negotiation, and resulted eventually in a satisfactory conclusion, this figure seems remarkably low, and suggests that new technology agreements are particularly difficult to negotiate. It seems likely that either they take an exceptionally long time to agree, or else there is such resistance to their negotiation on the part of management that many claims never result in formal agreements being reached.

13 respondents answered the question concerning the content of these new technology agreements, of which 4 represented actual agreements, while the other 9 were descriptions of claims in the process of being negotiated. These covered a wide range of difference clauses, non of which was universal. The most popular clause, included in nine of the agreements, covered training, while the least popular, surprisingly enough, covered redundancy. This may have been because redundancy was already covered in existing agreements, but could also have been a reflection of the view, common amongst trade unionists, that to negotiate a redundancy agreement was to accept the principle that redundancies would take place as a result of the new technology.

Respondents were also asked whether they, personally felt that their agreement was satisfactory. This was only answered by 7, of whom 2 felt that it was satisfactory, and 5 that it was not. Respondents were also asked whether they felt that their members were satisfied with these agreements. In response to this question 4 answered yes and 5 no. Finally, respondents were asked what they would advise others to do faced with a similar situation. This was answered by 8, whose advice generally focused on the need for people to keep themselves informed and to educate their members as to the possible impact of new technology.

In drawing conclusions from this group of responses, it is important to remember that they are from the minority of respondents from workplaces where negotiations over a new technology agreement were in progress or complete. Apart from the lone 'no hoper', the respondents appeared to be cautiously optimistic, and feel it is possible for trade unionists to negotiate reasonable solutions for their members faced with the introduction of new technology, if supplied with enough information, and equipped with the means to educate and organise their membership.

Changes Consequent upon the Introduction of New Technology

In general, there were fewer replies to the questions in this section of the questionnaire than to those in the earlier parts, a direct reflection of the fact that in many of the workplaces in the sample the new technology had not yet been introduced. In addition, the first question in this section, concerning numbers and types of employees before and after the introduction of new technology, was exceptionally difficult to answer for many respondents, since it depended on a type of detailed information to which few of them had access.

While responses to this question do not provide enough information to extrapolate with any degree of accuracy for other groups of workers, they do supply us with a picture which is overwhelmingly one of job loss, in both part-time and full-time employment.

The next question concerned changes in recruitment patterns. Here there were 16 responses, of which 8 reported that there had been no recruitment since the new technology had been introduced, 2 reported no obvious change in the pattern, and 6 reported that changes were more likely to favour younger females.

Here, the only major difference between the responses is between the two cases where new recruits required more skills and qualification and the one where qualifications were now lower. It is possible that this apparent

disparity can be explained not so much by additional skills and qualifications required as a result of the new technology but with the general raising of standards required by employers which takes place in the 'buyers' market' caused by a situation of high unemployment. Otherwise, the situation seems to be one where new recruits are most likely to be young and female. It seems that the older workers who were reported as being the group most concerned about their job prospects in reply to earlier questions may have had good reason for their anxiety. The fact that new recruits were more likely to be female could be an indication that new technology has the effect of de-skilling jobs which were traditionally male and thus 'feminising' them, or could merely be a reflection of existing patterns of job segregation and the higher turnover associated with female employment, indicating simply that vacancies come up more often in 'women's' jobs.

Grading

17 replied to the question on downgrading, of whom only one reported instances of downgrading after new technology had been introduced whereas 16 replied negatively to this question. To a question on upgrading, 8 answered yes while 8 answered no. It appears that a certain number of upgradings is common after new technology is introduced, appearing here in 50% of cases. Downgrading, however, is apparently rare. Whatever changes in skill content of jobs may come about as a result of automation, it seems unlikely that these will be reflected in actual downgrading of the operatives carrying them out, although, as the previous question indicated, it is possible that they may in the long term be replaced by a different type of worker. It is interesting to compare the number of cases in which workers were reported to have been upgraded, with the responses to the question on promotion prospects later in the questionnaire. In the light of this, it seems possible that some of these upgradings were

in name (and possibly salary levels) only, and did not reflect any real increase in status.

New Jobs Created

There were 18 responses to the question on new jobs after new technology had been introduced. These consisted of 10 'yeses' and 8 'noes'. In cases where figures for total numbers of jobs before and after the introduction of new technology were given, these jobs were invariably created in a context of overall job loss; in other words they were invariably much fewer in number than jobs which have disappeared as the consequence of automation.

Of these jobs, the majority are skilled jobs directly connected with computer operation. As far as the others are concerned, it seems likely that the stores clerical assistants were in fact connected with an increased work load rather than being created as a consequence of the new technology; that the word-processor operators' jobs were created in substitution for redundant typing/secretarial jobs and thus do not constitute 'new' jobs in the strict sense; that 'more juniors' may represent a de-skilling of 'senior' posts, and that the four electricians' posts created are connected with installation and maintenance of the new machines.

The next question asked whether these new posts had been filled by men, by women, or equally. Surprisingly, in view of the nature of the jobs, the replies showed an exactly equal balance between men and women, with two respondents saying that they had been filled by men, two by women and six saying that they had been filled equally. On closer investigation, it turned out that in one case where 'equally' had been the response, the post had in fact been filled by men; this reply having been given because the respondent felt that the employer did not discriminate against women in making appointment. Replies to this question were limited to ten, because this was the number which had answered 'yes' to the previous question.

Training

There were 20 replies to the question on training, 17 saying that some form of training had been given to operate the new machines and 3 saying that there had been none. This would seem to indicate that some form of training is the norm when new technology is introduced. However, the scope and duration of this training seems often to be minimal, judging from the replies to this question.

Types of Machines Introduced

18 respondents gave details of the types of machines which had been or were about to be installed at their workplace. In some cases more than one type of machine was brought in, so totals exceed the number of responses. As might have been expected, the largest group of types of machine was that composed of various types of computer with VDU input/output. These were mentioned in no less than 13 of the 18 cases. In addition, there were 9 different types of automatic production machinery, of which 2 were specified as being computer numerically controlled (CNC). 4 respondents mentioned word-processors; 2 microfiche systems; and 1 'pacesetters'.

When the word-processor cases are added to the others in which VDUs are introduced, this gives a total which implies that a very high proportion of workers are likely to be engaged in close-up screen work.

Working Conditions

There were 19 replies to the question on working conditions. Of these 8 felt that they had improved since new technology had been brought in; 7 felt that they had deteriorated and 4 reported no change. This would seem to indicate that, on balance, new technology would seem to bring with it some improvement in working conditions. Unfortunately, because of an ambiguity in the

interpretation of the phrase which was not anticipated, it is impossible to tell from these replies whether the improvement was in the workplace environment or in the terms and conditions of employment at the workplace. These improvements were heavily concentrated in the manual areas, where every respondent answering this question felt that there had been an improvement. In the white-collar areas, a majority felt that they had deteriorated.

Productivity

20 respondents replied to the question on productivity. Of these 13 reported an improvement in productivity, while 7 said that there had been no change. It is likely that few respondents have access to detailed information about productivity, although five were able to give a figure in answer to the question 'how much?' These were: 100%, 75%, 50%, 10-15%, and 'about 2,000 letters per week'.

In one case where the respondent had stated that there was no improvement in productivity, the project happened to bring to light evidence from the management in the same workplace, claiming that the new technology had brought with it an improvement in productivity of over 69%. This suggests that the picture presented by the replies to this question is in fact an underestimation of the real situation. Whatever the precise extent of the productivity increases, it would seem clear that the dramatic improvements in productivity promised by the manufacturers of microprocessor-based equipment are translated into reality in the majority of workplaces.

Promotion Prospects

There were 22 replies to the question on promotion prospects, which produced one of the most clear-cut, and perhaps one of the most worrying, responses in the entire questionnaire. 13 respondents said that they had deteriorated, 7 said that they had remained the same and only 2, both of them scientific and technical workers,

reported that they had improved. 'Gone for good' was the comment added to one reply in answer to this question. Given the preponderance of women's jobs affected by the new technology, as revealed earlier, this has worrying implications for equal opportunities.

Health and Safety

This question asked the respondents to tick any of a list of health symptoms which had been encountered among their workmates since the introduction of new technology.The symptoms were those most often suggested in the literature as possible side-effects of working with VDU screens. Since they were related specifically to VDU hazards, the question was not relevant for all respondents, and, indeed, it was answered only by representatives from workplaces into which VDU's had been introduced, 13 in all. All 13 reported an increase in headaches, and 10 in eye trouble, with 9 complaints of tiredness. It has been suggested by Bird (1980) that to ask a question in this form, e.g. 'do you suffer from backache?', is to encourage the answer 'yes' and thus to produce disproportionately high findings. The very wide variation in response to the different parts of this question would seem to indicate that this is not the case. There were some symptoms which only received one tick amongst all the replies, whilst others were ticked by almost all. In no case were all the symptoms ticked, suggesting that in each case some thought was given to giving a careful and accurate answer.

The very high incidence of headache, eye problems and tiredness revealed by these replies has disquieting implications for the future well-being of the increasing numbers of people obliged to work with VDUs.

Stress

The replies to this question also give cause for concern. Of the 16 who answered it, no less than 14 reported that stress had increased at their workplace since new technology had been introduced, while only 2 said that it had remained the same. In not a single case had the new technology eased the workers' levels of stress.

Individual Responsibility

There were 19 replies to this question. Five felt that workers had more individual responsibility since the new technology had been introduced, five thought there was no change, while 8 believed that they had less individual responsibility as a result of automation. In one case it was felt that senior staff would have more, but others, less.

Control over the Work Process

Respondents were asked whether they thought that workers had more or less control over their work since the new technology had been introduced. This was answered by 21, of whom only 5 felt that they had more control, 4 answered 'same' while 12 stated that they now had less control over their own work. These replies would suggest that in the majority of cases the machines are perceived as masters rather than servants of the workers.

Other Significant Effects

18 people answered this question, which asked whether in the respondents' opinion new technology had any other significant effects. Of these, 5 replied 'no' while 13 replied 'yes'. Only 2 of these 13 differing effects are positive ones, while 10 are obviously negative, suggesting that the experience of working with the new technology has, on the whole, not been a happy one.

General Effect on Women

Finally, an open-ended question was asked, designed to elicit more general and subjective responses, giving an impression of workers' views on the overall effects of new technology on women's lives. The question was answered by 12 people, of whom 6 felt that new technology had made women's lives more difficult while the other 50% were equally divided between those who felt it had made their lives easier, and those who felt that there was no difference, or that the benefits and disadvantages were equally balanced.

CHAPTER SIX

THE CASE STUDIES

This section of the report is an outline of what happened in the workplaces covered in a TUCRIC survey, drawn from the questionnaire responses. In a few cases, it was not possible to construct such an outline without breaching confidentiality, so these have been omitted. There were also a few cases where several very similar responses were received from similar workplaces. Here, the replies have been amalgamated to make one 'case study', but this is clearly indicated in the text.

CASE ONE — MAIL ORDER

This is a mail-order company which, as a result of extensive automation, has been converted into 'a computerised paperless office'. As a result, full-time clerical staff have been reduced from 1,000 to 550 and part-timers from 100 to 50. When broken down by sex, the job loss among full-time staff was from 200 to 100 for men, and from 800 to 440 among women. Thus, although more women's jobs than men's were affected the proportion was roughly similar, representing about 50% across the board. The two trade unions at the workplace had been active in responding to these changes, holding meetings with each other, with members, with full-time officials of the union, and with management. A detailed new technology agreement had been drafted and negotiated with the management, but the unions had found the negotiations hard going, and had not achieved everything they had hoped for. In particular they had hoped for a redundancy agreement, but the management had resisted this, claiming that their existing policy of natural wastage would cover the necessary reduction in staff.

Since the new technology had been introduced, there had been no general recruitment in the company, although a few specialists had been taken on in computer-related posts. Some employees had been upgraded in specialist areas such as computing, buying and organisation and method. So far, no down-grading of jobs had taken place, but a job evaluation scheme was in progress, and it was anticipated that this would result eventually in some down-grading. The respondent felt that it was too early to tell the extent by which productivity had improved, but some of the other consequences of the introduction of new technology had already become apparent. It was felt that working conditions had deteriorated, and that promotion prospects had 'gone for good'. VDU operators experienced headaches, eye trouble, increase in the use of alcohol and tranquilisers and depression. Stress had also increased, and it was felt that workers had less individual responsibility and less control over their work than before. Additional effects mentioned were de-skilling and increased unemployment.

CASE TWO MAIL ORDER

Another mail-order company, this serves as an interesting contrast to Case one, since computerisation was originally introduced ten years ago, and new technology has been experienced as a continuous process of creeping automation, rather than a once-for-all change. Perhaps for this reason, the respondent did not provide any figures for overall job loss, but the fact that the employer has a policy of non-replacement of staff who leave suggests that numbers are declining. Similarly, no overall figure was given for productivity increase, although productivity was said to be rising. However, one example was given of increased output in a typing-pool where, since the introduction of a word-processor, there had been an increase of about 2,000 letters a week. Many

employees were said to have been pleased at the introduction of new technology, in particular some of the younger staff who saw it as a means of releasing them from boring, tedious jobs. However, older workers were worried by the introduction of the new machines. This was not surprising, since the trend of recruitment of staff was towards younger women, with higher qualifications (GCEs were mentioned). Younger women were described as being able to adapt to the new machines with little trouble, whereas older women had difficulty. Several young women had been made supervisors or moved to other offices, and there was no evidence of down-grading. New jobs created were for computer-programmers, analysts, and VDU operators. These had mainly been filled by women, but the respondent commented that the question was 'difficult because more men had been recruited as executives but the workforce is mainly female.' In all, the firm employs 2,200 women and 1,500 men.

The new technology was considered to have resulted in an improvement in the working environment, but promotion prospects had deteriorated. Health effects mentioned were headaches, backaches, pain in wrists and elbows, complaints of tiredness and depression and sleeplessness. Stress had increased, and workers were thought to have less individual responsibility and less control over their work. It was also commented that 'the girls using the word-processor get restless'. New technology was considered to make life more difficult for women 'because most women enjoy working in a relaxed atmosphere. Computerisation etc. puts more pressure because of the need to work at set speeds.'

CASE THREE MAIL ORDER

This was another mail-order company, smaller than Cases 1 and 2, employing approximately 100 men and 260 women. The workforce was described as having been worried when

informed of the introduction of new technology through their union negotiating channels. Trade union members had wanted to resist some of the management's proposals, but non-trade union members had been happy to accept them. The union had been active, calling meetings of the members, and negotiating with management and meeting with full-time union officials, but because in the past new technology had been introduced without formal agreement with the union, they found it difficult to negotiate satisfactory terms.

No figures were given for job loss, but the company had a policy of non-replacement of departing staff. Where new recruitment was taking place, workers were getting younger. Some training had been given for working the new equipment, and some employees had been upgraded. However, promotion prospects had deteriorated. Working conditions were considered to have improved, although a number of negative side-effects of working with new technology were reported. Stress levels had increased, perhaps as a consequence of the increase in productivity which was also reported, and workers using visual display units experienced headaches, backaches, eye trouble, pain in the wrist and depression, and there had been an increase in the use of tranquilisers. The respondent felt that although there was less individual responsibility than before, workers had more control over their own work. Stress and failing eyesight were mentioned agains as being the effects of new technology most affecting women and making their lives more difficult.

CASE FOUR A NATIONALISED INDUSTRY

In this case, the respondent was one of 60 female clerical workers employed by a nationalised industry, all of whose jobs were affected by the introduction of new technology. In this case, no male jobs were affected. Workers had found out that new technology was to be introduced from a

number of sources; from management directly; from management through union negotiating channels; from union information; and from other workers in other parts of the organisation. They had also had some pieces of equipment installed for a trial period without consultation with the workers directly affected. The workers had been divided in their response, some welcoming the new machines, and some being worried about them. In particular some non union members had felt that it would mean better working conditions, being pleased about the prospect of no longer having to handle paper. The union at the workplace had negotiated an agreement covering procedure, training and retraining, working practices and work rates, with which the majority of the workforce was satisfied. However, a small minority did not consider this agreement good enough. No figures were given for job loss, although the organisation had a policy of natural wastage. There was no official redundancy agreement, but the respondent felt that there was an unofficial policy of encouraging early retirement and other ways of reducing staff numbers.

No upgrading or downgrading had taken place as a result of the introduction of new machines, and training to use them had consisted of one four hour morning session. The respondent believed that after an initial period when productivity had dropped because of the workers' unfamiliarity with the new working methods, there had been a steady increase which had levelled off at a point similar to that reached before the new machines had been introduced. However management in this organisation claimed that there had been a 60% productivity increase using the new equipment.

Promotion prospects had deteriorated, and it was felt that working conditions had also got worse since the new technology had been introduced. Stress levels were said to have increased greatly, and there was 'quite a lot more aggro now'. Individual responsibility remained unchanged, but workers had less control over their own work. In addition, about 75% of the operators had reported increases

in headache and backache, all of the workers had increased their consumption of tea and coffee, and 'most' women had experienced pain in the wrists (tenosynovitis) and exhaustion. The respondent also mentioned red and sore eyes and a general deterioration in eyesight as additional effects. The respondent found these effects so distressing that she said that if jobs were not so scarce she would leave, since she went home shattered each evening from having to stare at the screen for 6 3/4 hours each day. Surprisingly, in view of this, she felt that new technology had made life easier for women in that the work had become cleaner and lighter. However she also remarked that management now exercised much closer control over the workers, and encouraged them to work faster all the time, which meant increased amounts of time exposed to the hazards of staring at bright screens.

CASE FIVE QUANGO

This was the regional office of a QUANGO, where it was estimated that approximately 12 of the 120 women's jobs and 4 of the 40 men's jobs were likely to be affected by the introduction of new technology in the accounts and typing departments. Workers had been given no official information about the introduction of new machines, and had found out that they would be brought in by rumour and from other workers in other parts of the organisation. The initial reaction was lack of interest, but when the trade union had been alerted, and meetings held and literature produced for the membership, clerical workers had begun to worry about the likely consequences on their jobs. An agreement had now been reached, covering procedure, information, health and safety, hours, training and retraining, transfer to other departments within the organisation, working practices, extra payments and regrading. The workers were happy with this agreement at present, but because the new machines had not yet been installed it was too early to tell whether it would prove

satisfactory in practice. Similarly, it was not possible to describe any other effects of working with the new machines.

CASE SIX — A CHARITY

This was a charitable organisation employing two men and four women of whom three were secretaries. All three secretaries were likely to find themselves with fewer letters to write following the introduction of a word processor, to be operated by a volunteer working from home producing fund-raising letters. Despite a cash crisis in the organisation, nobody was to be made redundant, although voluntary redundancy was in principle accepted, and if anyone had left she would not have been replaced.

CASE SEVEN — HOUSING DEPARTMENT

This was a council housing department employing approximately 240 men and 200 women in seven different trade unions. The application of new technology at issue was a minor one: the introduction of two VDU terminals to enable letting staff, housing control staff and clerical staff to gain direct access to information stored in a central computer. The union whose members were concerned had taken this seriously, holding meetings with its members, conducting research and negotiating with the management. The machines had been blacked until agreement had been reached over the regrading of the staff who were to operate them, but no general agreement over new technology had yet been reached, although negotiations were in progress. No jobs had been lost, despite an increase in productivity, and no other effects had been observed as a consequence of the introduction of the new machines, possibly because they were used for short periods by large numbers of different people, rather than providing continuous screen work for a few.

CASE EIGHT SALES

This was a sales organisation with a number of agents in the field. No overall figures were given for numbers of employees, but the job descriptions were supplied for 6 jobs which had disappeared when the department dealing with insurance was computerised. These consisted of three insurance clerks, a bookkeeper, a cheque typist and a commission clerk. The number of separate tasks listed in these job descriptions which had vanished, was 29, ranging from 'keep record of all cheques used for security purposes' to 'prepare quotations for customers from information given'. In addition to these three clerical jobs, a cloakroom attendant's job had also disappeared when the department had closed, and with it, its lavatory. Information was not provided on any other effects of this application of new technology.

CASE NINE HOUSING CORPORATION

This case concerned another very minor application of the new technology, the introduction of a microfiche viewer into the offices of a housing corporation, to enable staff to retrieve information which had previously involved contacting the head office of the organisation.

Workers had found out that it was to be installed directly from management, and the trade union had not been involved in any way. None of the workforce had shown any concern about its introduction, and no training had been given in its use. However, since its introduction, workers using the machine had complained of increases in headaches and tiredness. The only other change noted was that workers now had more control over their work, since they had immediate access to information which had previously only been available with the cooperation of head-office staff.

CASE TEN FOOD MANUFACTURE

This was a smallish food manufacturing and supply company, employing 50 men and 13 women. None of the male jobs were affected by the introduction of new technology, but 8 of the women's were, when several visual display units were introduced into the office.

No information had been given to the employees that the new equipment was forthcoming, it had simply been installed without consultation. At the time, no concern had been expressed by the workers, and no action was taken by either of the trade unions at the workplace, since at that time the office workers were not unionised.

The company operated a policy of non-replacement of staff who left, and since the new technology had been introduced no recruitment had taken place.

Training for operating the new machines had consisted of a three-day training course for one worker.

Changes noted since the new technology had been introduced were: a general deterioration in working conditions; an increase in headaches and backaches, increased numbers of complaints of tiredness; neck ache and increased stress. It was also felt that workers had lost some control over their work. No figures for productivity increase were available, and there seemed to have been no changes in promotion prospects.

CASE ELEVEN THE BANKS

In this case, nine different responses, all of them from bank staff, have been amalgamated because of their similarity. Three of the four big clearing banks were represented among these responses, the branches varying in size from the largest, with 60 employees, to the smallest with 16. With one exception, all the respondents were female, 3 secretaries, 2 clerks, 3 clerk/cashiers and 1 machinist.

In all cases where a sex breakdown was given for existing jobs at the bank branches, there were equal numbers of men and women, except in one case where there were 12 women but only 8 men.

The great majority of bank employees seemed likely to be affected by the introduction of new technology. Occupation specificed were: cashiers, statement clerks, terminal operators, standing order clerks, typists, secretaries and 'lower grade jobs'.

The majority of workers were described as 'worried' at the prospect of new technology being introduced, although in a few cases some were described as 'apathetic'. In general, it was those workers whose jobs were most directly affected who were described as the most worried. One respondent reported that some employees felt that their jobs contained a human element which could not be automated, and were thus worried not about redundancy but about their promotion prospects.

BIFU, the banking union, appeared to have been active over the question of new technology. In all cases, respondents had learned of the introduction of new technology from union information, although some had also heard from fellow-workers in other parts of the organisation and, in one case, through individual workers being asked to retrain. As well as negotiating with management over the introduction of new technology, the union had undertaken research, produced literature for the membership, and, in 4 of these branches, organised workplace meetings with the members. The negotiations over the new technology covered a wide range of issues, including procedure, information, health and safety, hours, training and retraining, transfers to other jobs within the organisation, working practices, extra payment, and regrading. In no case had negotiations been concluded, however, and workers were not satisfied with the proceedings in any case where this question was answered.

Since negotiations are conducted nationally in the banking industry, it seems likely that several of the respondents felt out-of-touch with their progress, and, in some cases, ignorant of their exact development. A further problem specific to the banking industry is the existence of a great deal of computerised equipment which has been in operation for many years. The introduction of new technology is thus experienced as a continuous process, rather than a once-for-all change. Some respondents clearly felt that it was impossible to define what was 'before' and what was 'after' the introduction of new technology, and failed to complete this section of the questionnaire. In the cases where this section was tackled, the technology referred to was word-processors, VDU terminals and cash dispensing machines.

Regarding recruitment, it was felt that in the future workers were more likely to be female with lower grade qualifications. However, where new jobs had been created, mainly for operators, these were described as being filled by both men and women, 'but not equally'. No existing staff had been upgraded or downgraded as a result of the introduction of the new machines. Staff numbers appeared to be shrinking, 4 branches reported a policy of natural wastage, while 5 also reported the existence of redundancy agreements (there was not, of course, any evidence that people were actually being made redundant). The one respondent who gave details of the principle on which the redundancy agreement operated, said that this was 'voluntary redundancy' and 'part-timers first'.

No figures were given for job losses or gains, presumably because of the impossibility of obtaining these in relation to large national organisations with many branches scattered about the country.

Working conditions were said to have deteriorated since the introduction of new technology, and so were promotion prospects. It was also felt that workers had less individual responsibility and less control over their own

work. Stress was considered to have increased too, as had headaches, backaches, eye trouble, pains in the wrist and the consumption of tea and coffee.

In an industry which has traditionally seemed to provide relatively good prospects for its female employees, it was interesting that the only respondent to answer this question considered that new technology had made life more difficult for women, since it had 'further compressed the choices and opportunities for women'.

CASE TWELVE THE UNIVERSITY - 1

Here, the respondent was a secretary, working in a university. Here the clerical workers had only found out about the introduction of new technology through rumour, and were mainly 'worried' at the prospect, although some were 'unconcerned'. Secretarial staff were widely scattered in separate departments throughout the organisation, so the union had no means of monitoring the rate of introduction of new technology without asking its members to spy, something it was reluctant to do. However the union which had a policy of blacking the new machines until an agreement had been reached with management, was becoming increasingly concerned at what was seen as management's stalling over the negotiations, and its policy of introducing new machines in a 'creeping and piecemeal' fashion. Concern was also expressed at the fact that staff who left were not being replaced.

CASE THIRTEEN THE UNIVERSITY - 2

This response was in fact from the same organisation, the university, as case twelve. However it is treated here as a separate case because it concerns a very different application of the new technology and its effects on a different group of workers. Here, instead of the introduction of many small machines such as word-processors for administrative work, we have one large computer being brought in for academic purposes. In this

case, the staff affected are mainly programmers, systems analysts, research workers and lecturers, about 100 people in all, of whom three-quarters are male.

Information about the new machines had come directly from management, and the workers were described as unanimously 'pleased' and 'in favour' of its introduction.

Despite the fact that the employer had a policy of natural wastage of certain fixed-term posts, no job loss was anticipated as a result of the introduction of this machine, and indeed six new posts had been created to deal with extra programming work. The respondent saw no changes in the type of person recruited, and there had been no changes in grading. Promotion prospects were unaffected too, but it was thought that working conditions had generally improved, as had productivity. Stress levels had increased for those working directly with the machine, but it was anticipated that this would decrease again as the operators become more familiar with the new systems. It was felt that individual responsibility had remained the same but that workers now had more control over their own work. The respondent believed that the new equipment would result in an improved service and a quicker turnover of work.

CASE FOURTEEN — THE PUBLIC LIBRARY

Here the respondent was a library assistant working in a public library into which a computerised information retrieval system had been experimentally introduced. Actual equipment introduced into the workplace consisted of visual display units, a television display monitor, a printer, a keyboard and a telephone linking up to the computer terminal. 9 women's jobs and 4 men's would be affected by the experiment and, if the scheme was extended, about 40 women and 15 men would find their jobs affected. The response to the new technology however had been one of indifference from most of the staff most likely to be affected by it, though senior post holders had appeared 'excited by the new toys'. It was pointed

out that it was also the senior staff who were most likely to benefit from the new technology in terms of an increase in individual responsibility. They had also been given training in the optimum use of the machines. The respondent thought that junior staff were indifferent because of a lack of information. Significantly, they had not heard about the new machines from their own union but through rumour and information from management via non-union channels. In fact the union had begun negotiating over new technology at the time the questionnaire was completed, but no agreement had yet been reached, despite the fact that the new machines were now in operation.

There had been no job losses or redundancies as a result of the new technology but neither had any new jobs been created. It was too early to measure whether productivity had increased, but substantial increases were anticipated. A quantitative measurement of this increase would in any case be difficult to achieve because of the nature of the work. Promotion prospects had not yet been affected either, but some preliminary effects of the new technology were already visible. Among those already operating the machines, an increase in stress was the effect singled out. However, working conditions had also deteriorated for those not working directly with the machines because of the overcrowding which had been created in the workplace when they were introduced.

CASE FIFTEEN RESEARCH & DEVELOPMENT

This was a research and development organisation connected with the clothing industry. Two distinct types of application of the new technology were at issue here. The first of these was in the office, as a direct aid to the research work and to internal office administration. Here, the new technology had been welcomed by staff (most of whom were specialist scientific and technical workers) who exploited it to its fullest potential, especially the younger employees.

The organisation was also concerned with developing computerised equipment for application on the shop floor in the industry. Developing these systems had in fact created a few new jobs within the organisation, but the respondent recognised that there would be an adverse effect on the employment of manual workers in the industry as a direct result of this equipment coming into operation.

CASE SIXTEEN THE TELEVISION COMPANY

Two responses have been grouped together here, since they are from the same organisation, a television company. One was an electrician and the other a clerical worker, but both believed that their jobs would be affected by new technology as would their 1500-odd fellow-employees. All three unions at the workplace had been active over the issue, holding meetings with their members, with each other and with management and undertaking research and producing literature for the membership. Since the new technology had not yet been introduced, it was too early to tell what its effects were.

CASE SEVENTEEN THE WAREHOUSE - 1

This was a warehouse into which computerised stock control had been introduced. The respondent was at pains to point out that not all job loss was connected with the introduction of new technology. A fall in orders because of market shrinkage had led to a reduction in staff from 'well over 300 full-timers' in 1972, to 140 full-time and 16 part-time staff in 1977, when the new technology had been introduced. Since then, numbers had fallen to 68 full-time and 8 part-time employees and the number of grades had been reduced from 3 to 2. Productivity had risen by 75%.

No recruitment had taken place since the new technology was introduced, so it was difficult to tell if there was a change in the company's requirements. Some new jobs

'connected with the computer' had been created elsewhere in the organisation, and so far as the respondent knew, had been filled 'equally'. Promotion prospects were not thought to have changed but VDU operators complained of headaches, backache, eye strain and tiredness. Stress had increased. Workers were considered to have more individual responsibility but less control over their work. The respondent, who was a man, thought that new technology had made life more difficult for women because 'an increase in productivity at the company had resulted in greater stress upon women, consequently their lives become more difficult'.

CASE EIGHTEEN THE WAREHOUSE - 2

This was the large warehouse of a firm employing 800-900 people, 80% of whom were female. A new system was to be introduced which would automate belt operation, stock movement, stock control, assembly and packing, resulting in what would become an almost entirely automatic warehouse. At the time the questionnaire was completed, the new system was not fully operational, so the respondent was not able to quantify employment or productivity changes. However it was already clear that stockmen's jobs would be eliminated as a result of the computerisation of stock ordering and control; and that computer-controlled belt movement would also make 14 female jobs redundant. Assembly workers would be retrained and regraded. The respondent considered that 'there will be extra strain put upon some of the female workers. Some will be able to cope with this better than others. I also think that the shop floor workers will have <u>less</u> control over the work with the new method created with new technology ... Productivity will improve;'. She also thought that in some respects the work would become safer, because waste would be controlled and empty cartons would be disposed of, leaving the floor clear. She also felt that life would become easier in

some ways for women as a result of the new technology 'because it takes the heavy manual part of the job away'.

CASE NINETEEN MANUFACTURING

This was a manufacturing company making machine components employing about 400 men and 50 women. The new technology which was about to be introduced would, according to the respondent, affect about 20 male jobs but no women. These were shift production workers who collected machine running conditions. It was thought that, as a result of the new machinery, one man per machine per shift out of a crew of 6 including a chargehand would be redeployed to packing and despatch. This effectively meant a small reduction in manning levels. The respondent reported that only about 10% of the workforce were worried at the prospect of new machines being brought in, the remaining 90% being unconcerned. Workers had not heard of the new machines through their normal union negotiating channels, but through rumour and information dropped casually by management. However as soon as it was known that the machines were to come in, the union had responded by holding meetings with the members and opening negotiations with management over a new technology agreement covering information, training and retraining, demarcation and extra payments. At the time the questionnaire was completed, this had not been finalised.

Apart from the reduction in manning levels, the respondent felt that the only change brought about by the new technology was an increase in individual responsibility, which was not accompanied by any increase in control over the work process.

CASE TWENTY ENGINEERING - 1

This was a large engineering company employing about 4,000 workers, about three-quarters of them men. A new computer system and new production machinery had recently been introduced, but only in areas were productivity increases

on a large scale were possible. Workers had heard of its introduction through a variety of channels, including official union ones, and the union had responded by holding meetings with the members and negotiating with management. A new technology agreement had not been sought because existing agreements already covered most eventualities. In general, the workforce was satisfied with these agreements, but the respondent felt that agreements on paper were no substitute for an active organised union membership, and believed that more could have been achieved.

A natural wastage policy was in operation at the company, which also had an 'extensive and expensive' redundancy agreement. The respondent felt that, although no redundancies had been created when the system was introduced, natural wastage would eventually mean that there would be 'less of everyone'. A few jobs had been downgraded after the new technology was brought in. These were mainly new employees in the lower grades who felt that their jobs were vulnerable and did not wish to 'make waves'. Thus there had been no effective protest. Some jobs had also been upgraded, but these were exclusively posts directly connected with the computer and systems design. The creation of these few higher grade posts had not, however, improved promotion prospects for those within the company, since they had been filled by 'whizz-kids' brought in from outside. In general, it was the 'planning-type and clerical jobs' together with some production and supervisory positions which were most effected by the new technology, and the respondent (a man) felt that proportionately more female jobs than male were involved.

Health and safety problems were considered to have increased for white-collar staff but not for production staff, who had already been suffering from headaches, backaches etc., before the new technology was brought in. Stress was considered to have increased in all areas, but individual responsibility remained unchanged. It was felt

however that workers had now less control over their work. The only additional effect noted was 'increased cynicism that a clapped-out production facility had such a wonderful computer. The respondent thought that new technology would make life more difficult for women because 'many would lose their jobs'.

CASE TWENTY-ONE ENGINEERING - 2

This was another engineering firm employing 460 people, divided more or less equally between men and women. The new technology introduced included a new computer with VDU input. Although management had informed the union about the introduction of the new machinery, according to the correct procedure, no action whatsoever had been taken by any of the three unions at the workplace, and the workforce appeared unconcerned about it. No staff had been made redundant as a result of the new equipment, neither had there been any downgrading. One person had been upgraded and there had been a few new jobs created on the clerical stores side. The respondent thought that these had been filled equally.

Working conditions were not considered to have changed but an increase was reported in the instance of headaches, eye trouble resulting from glare and tiredness. It was also stated that general stress levels had increased, although it was felt that individuals had more control over their work and more responsibility. It was too early to tell what the effects on productivity had been.

CASE TWENTY-TWO ENGINEERING - 3

This was another engineering factory three-quarters of the workforce of which was male. The respondent reckoned that a quarter of all jobs, mainly those of clerical workers, were affected by the introduction of new technology.

Employees had found out about the introduction of new technology from other workers in other parts of the organisation, and not through union or management

channels. The majority of workers responded with a lack of concern although a minority were worried. Trade union members had responded more than had non-trade unionists who felt that it did not concern them personally and was therefore unimportant.

The union (which represented shop-floor workers) took no action over the introduction of new technology into the offices, but negotiations were under way with management over an agreement covering information, hours, health and safety, training and retraining and working practices should new technology be introduced on the shop floor. Since the respondent was not himself an office worker, no information was available as to the changes which had taken place in the offices since new technology had been introduced.

CASE TWENTY-THREE ENGINEERING 4

Two computer numerically controlled (CNC) machine tools were the form of new technology introduced into this engineering company which employed about 200 people, only 30 of them women. Five male jobs were affected in the production area. Only a minority of trade union members had been concerned when informed through their union negotiating procedure that the machines were to be introduced. They had conducted research, organised a meeting with the other unions in the workplace and embarked on negotiations with the management. This had yet to be agreed. The company already had a policy of natural wastage and a redundancy agreement operating on the principle of voluntary redundancy, early retirement and 'last in first out'. Three workers had taken advantage of the early retirement scheme, but there had been no other redundancies. No jobs had been downgraded or upgraded, nor had any new jobs been created. However, the respondent reckoned that productivity had increased by 50%.

He felt that working conditions had improved as a result of the new technology and that workers had more individual

responsibility and more control over their own work since it had been introduced. Promotion prospects had also improved, and no hazards specifically related to the new technology had been observed.

CASE TWENTY-FOUR ENGINEERING - 5

This respondent was a tool maker in a large engineering works employing about 3,000 men and 500 women. He felt that every single one of these jobs, male and female, would be affected by the introduction of new technology.

Employees had been informed about the new machines through official union channels, but again the response had been one of total unconcern, from both trade unionists and non trade unionists alike. The union had produced some literature for its members and sought an agreement covering the introduction of the new technology with management but so far these negotiations had not achieved any results.

Training had been given for working with the new equipment, and four new jobs had been created, all of them filled by men. No significant changes in grading had taken place, and there had been no recent recruitment in the company so it was impossible to tell whether recruits were younger or older or more or less qualified.

In general, working conditions were thought to have improved as a result of the new technology but the respondent did not know of any specific benefits or hazards associated with working with it. He reported an increase in individual responsibility, but felt that workers had about the same degree of control over their work as before. Productivity had risen by approximately 10-15%. Promotion prospects had completely gone. The respondent thought that new technology would mean an increase in work for tool makers.

CASE TWENTY-FIVE ENGINEERING - 6

Yet another engineering company, this employed 850 people, of whom only ten were female. The factory had undergone extensive re-equipment recently, new machinery including 6 CNCs as well as several other types of automated production machinery. All of these were operated by men, and the respondent did not know precisely how many jobs would be affected. All the operators who would be working with the new machines had been sent on a manufacturers course to be trained i.. their use. This was one of the few cases where the trade union had succeeded in completing negotiations over a new technology agreement. This included provisions covering training and retraining, working practices, demarcation, extra payments for working the new machines (a 2½ pay increase) and a pension scheme. A policy of natural wastage was already in operation.

No changes in grading had taken place nor had any new jobs been created as a result of the introduction of the new machines. Productivity had remained the same for the factory as a whole, but fewer workers were needed to achieve the previous level of output.

It was thought that working conditions had improved as a result of the new machines, but that this was the only positive benefit resulting from their introduction. Stress had increased and there were increased complaints of depression and in consumption of tea and coffee. The respondent also reported that workers were now much more bored than before, and had less individual responsibility and less control over their work.

CASE TWENTY-SIX THE FURNITURE FACTORY

This was a furniture factory of whose employees only 20% were female. Since none of the women worked on the shop floor, their jobs were not affected by the new machines which were introduced to automate the process of preparing the sides of furniture units. It was thus male pre-assembly jobs which were affected and some workers had

been redeployed as a result. A redundancy agreement had also recently been introduced, operating on the principle of part-timers first. A natural wastage policy was also in operation.

Employees had discovered that the new machinery was to be introduced through rumour and directly from management, and the trade union had not been involved either in informing the members or in negotiations over its introduction.

One or two employees working on the new machines had been promoted, but they were already skilled workers and this had not made much difference to their circumstances. No new jobs had been created, but neither had any employees been downgraded.

The respondent believed that workers operating the new machines now had more individual responsibility but less control over their own work. Productivity could not be assessed accurately as the machines were not working properly, but had they done so it was considered that it would have increased considerably.

CASE TWENTY-SEVEN PRINTING

This was a large printing firm which had been extensively modernised with the introduction of 12 visual display units, 4 pacesetters and 4 web-fed litho machines, replacing the letterpress machines. The unions had been fully involved in negotiations over this re-equipment and had succeeded in reaching agreement over procedure, information, hours, training and retraining, transfers between jobs within the organisation and extra payments. Other benefits gained included a reduction in the working week, an improved sick pay scheme and improved wages for overtime and night work.

Most of the workforce had been in favour of the introduction of new technology, the exceptions being certain older workers and some of the lesser skilled operatives.

On the whole it was more senior men who had been retrained to work with the new equipment, and had as a result achieved superior earning levels. Training courses had been held both in this country and abroad. Although no existing members of the workforce had been downgraded because of the introduction of new technology, the type of worker now being recruited was younger and more highly skilled, although the type of skill now required was different from those of the traditional letterpress operator.

The respondent believed that staffing had decreased through natural wastage and would continue to do so in the future. There had been no increase in terms of staff numbers, but new jobs in terms of nature and name had evolved.

In general, working conditions had improved, at least in so far as the environment had become cleaner and quieter. However new hazards had emerged, and keyboard operators now complained of eye strain. There was also an increase in general stress levels due to faster operating speeds of the machinery and a need to increase productivity. There had already been dramatic increases in productivity as a result of the new technology, estimated by the respondent at leart 100%, this achieved with a reduction of staff. Individual responsibility had decreased and more workers were now employed as foremen and overseers. The individual also had less control over the work process, and workers had become 'button pushers' of 'key tappers' and now needed to 'think less but concentrate more'.

The respondent had little or no contact with the women employed in the company, but believed that their positions had, in most cases, been made worse because of the introduction of shift-working.

CONCLUSIONS

1. Women's employment in West Yorkshire, as in Britain as a whole, is heavily concentrated in a relatively small number of occupations and industries; in clerical work; in cleaning and catering; in selling; in the 'caring professions'; in the textiles industry; in tailoring; in the food industry; and in packing and assembly jobs in other manufacturing industries. Directly or indirectly the introduction of new technology can lead to job losses in all of these areas.

2. In the great majority of cases, these job losses are taking place by natural wastage, rather than actual redundancies.

3. The only new jobs being created in substantial numbers as a consequence of the introduction of new technology are in scientific and technical areas. These are jobs for which proportionately much fewer women are qualified than men. There is also little evidence that women made redundant by the introduction of new technology are being offered re-training in technical skills.

4. Where new technology is introduced into mixed workplaces, women's jobs are much more likely to be affected than men's jobs. In the TUCRIC survey, 60% of workplaces employed more men than women, but in only 17% of cases were more men's jobs than women's affected by automation.

5. In some areas, such as teaching, the existence of new technology is likely to bring about a shift in skill and knowledge requirements, which could result in more men than women being qualified to apply for new posts.

6. In other areas, a change in skill requirements resulting from the introduction of new technology can bring about a substitution of female for male labour. Two of the mail-order offices in the survey revealed a trend for new recruits in lower grade clerical occupations to be female.

   There is also some evidence of a trend towards the appointment of younger women at the expense of older women's jobs.

7. The introduction of new technology resulted in a decline in promotion prospects in the majority of cases, only 9% of workplaces in the sample reporting an improvement, compared with 56% where promotion prospects had decreased and 35% where they had remained the same or it was too early to tell.

8. There was also a marked increase in stress, which had risen in no less than 88% of cases and remained the same in the remaining 12%.

9. New technology also appeared to bring with it a disturbing range of new health hazards. Most dramatically, of those answering this question in the survey, 100% reported an increase in headaches, 77% an increase in eye trouble and 69% an increase in tiredness after the new technology had been introduced.

10. In the majority of cases respondents also believed they now had less individual responsibility and less control over their work.

11. For manual workers, new technology had universally brought about an improvement in working conditions; for white-collar workers these had improved and deteriorated in equal proportions.

12. There is some evidence that new technology brings with it a trend towards more 24-hour working, for instance in banking, in the textiles industry and in printing. This has the effect of reducing opportunities for women.

13. The survey uncovered no evidence of 'Luddite' attitudes among workers faced with the introduction of new technology. Although 47% were 'worried' at the prospect of new technology, none were 'opposed' to it. The dominant response was unconcern, which seemed to be related to lack of information.

14. There was some evidence that trade unions had not in all cases been as active as they might. In 18% of the workplaces in the sample, no action whatsoever had been taken, and in 42% no meetings had been held with the membership. In only 30% of cases had literature been produced to inform members about new technology.

15. Managements seemed to have been less cooperative. While unions had sought agreements with management over the introduction of new technology in 69% of cases, such agreements had only been achieved in 16% of workplaces in the sample. Given that trade unions were recognised as having bargaining rights for at least some of the workforce in all cases, and allowing for the fact that in some cases negotiations may still have been in progress, this seems nevertheless, to be an extremely low proportion.

In summary, we have a situation where as a result of traditional patterns of job segregation, and inadequate education and training in scientific and technical subjects compared with men, women are disproportionately affected by the introduction of new technology. Not only are they more likely to lose their jobs, but they are also

more likely to find that the quality of work has deteriorated in the jobs that remain. There appears to be a low level of awareness of these problems, and collective bargaining does not seem to have mitigated them in the majority of cases.

RECOMMENDATIONS

Research

1. That further research should be carried out by the Equal Opportunities Commission or other interested bodies, on existing patterns of job segregation by sex and the extent to which these are being modified by the introduction of new technology.

   This research would be facilitated by:

   (a) as speedy a release as possible by the Office of Population Censuses and Surveys of the relevant results of the 1981 Census of Population.

   (b) a more detailed breakdown of employment data by occupation within industries by the Department of Employment.

2. That further research is carried out on the effects on operators' health of working with visual display units, and that efforts are made to investigate ways in which these machines can be redesigned to eliminate health hazards, with the direct involvement of affected workers.

Monitoring

3. That local authorities, at city and/or county level, inform themselves of the automation plans of organisations in their area and trends in employment, and, where possible, make this information public so that concerned organisations can act upon it.

Education and Training

4. That education and training organisations should:

   (a) Review their existing practices with a view to finding ways of encouraging more girls to take up scientific and technical subjects, in

particular those which could lead to a career in data processing, systems design or maintenance.

(b) Where appropriate develop new courses for young people in these areas.

(c) Develop 'second chance' courses in these subjects for older women who have been made redundant, or who wish to return to work.

5. That employers should take particular account of women's training needs in designing in-service courses. Women employees should be encouraged to train for promotion rather than simply to do their existing job more efficiently.

Information Provision

6. That employers should keep their workforce informed of their automation plans. In particular, employees in affected jobs should be given as much information as possible, as far in advance as possible, of any new equipment likely to be brought in, and its possible effects.

7. That trade unions should keep themselves informed of the effects of new technology on employment levels and working conditions, and keep their members as well informed as possible, in particular, alerting them of any adverse effects.

New Technology Agreements

8. That, except in cases where the existing negotiating machinery makes them unnecessary, employers and trade unions negotiate new technology agreements, laying down the terms and conditions on which it is to be introduced, and taking account of some of the factors which particularly affect women;

(a) Twenty-four-hour working to be avoided wherever possible.

(b) Training and retraining provisions which enable women to qualify for promotion.

(c) Protection of employment for existing staff, including part-timers - options such as job-sharing and shortening working hours to be explored before redundancies are discussed.

(d) Any other provisions which seem appropriate.

Planning

9. That local authorities should seriously consider refusing planning permission, grant aid or other forms of assistance to employers refusing to agree or implement such new technology agreements.

10. That planning departments should explore ways in which positive applications of new technology can be developed in their areas, creating new jobs, especially in ways which are of benefit to the community. This could perhaps be achieved by cooperation with Cooperative Development Agencies, resource centres or appropriate departments in local universities or polytechnics, or by setting up special departments within the authority.

Ref: 5/27 D5. 8.10.82.

APPENDIX I

TUCRIC NEW TECHNOLOGY QUESTIONNAIRE

CONFIDENTIALITY. Please tick here if you'd like this information kept anonymous

name ..... sex .....

address .....

..... phone .....

employer .....

employer's business .....

What is your job? .....

What is your union? .....

Are there any other unions involved in negotiations at your workplace?

If so, what are they? .....

How many employees are there at your workplace? Male ..... Female .....

How many of these jobs do you think may be affected by new technology?

Male ..... Female ..... What types of jobs are affected*.....

.....

Does your employer have a policy of 'natural wastage' or non-replacement of staff who leave? ..... Is there a redundancy agreement?.....

If so, what principle does it operate on? (Please tick)

voluntary redundancies early retirement

'last in, first out' 'part-timers first'

other (please give details) .....

How did you find out that new technology was going to be introduced? (Please tick)

Rumour Informed by management through Union negotiating channels

Informed by management via other channels Union information

Individual workers asked to retrain Redundancy notices

Informed by other workers in other parts of the organisation

Other (please state) .....

* It would be extremely helpful if you could send us sample copies of job descriptions of affected workers, if these are available.

What was the response of your fellow-workers to this information? (please tick)

worried pleased unconcerned opposed to new technology.

in favour of new technology other (please state).....

Were there different responses from TU members and non-TU members?.....

Could you describe the difference? .....

.....

Were there different responses from people doing different types of jobs?....

.....

Could you describe the difference? .....

.....

What action was taken by the union in response to the information that new technology was to be introduced? (please tick)

Meetings with members Meetings with management Research

Meetings with full-time officials of the union produced literature for the membership meetings with other unions at the workplace

No action Industrial action (please specify).....

.....

Did the union seek to get an agreement with management covering the introduction of new technology.....Has such an agreement been reached?.....

If so, which of the following does the agreement cover? (please tick)

Procedure Information Health & safety Hours

Retraining and training Transfer to other jobs within the organisation

Working practices Demarcation Extra payment

Regrading Redundancy Non-wage benefits (e.g. nurseries, canteen, restrooms, pension scheme improvements) Please specify .....

Other (please specify).....

If you are able to send us a copy of this agreement, we should be very grateful.

Do you regard this agreement as satisfactory?.....If not, why not?.....

.....

Do you think your members are satisfied with this agreement?.....

What would you advise other workers to do, faced with a similar situation?

(Please continue on the back of this sheet if necessary).....

.....

This section applies if new technology has already been introduced at your workplace

What changes have there been in numbers of employees since the new technology was introduced (if you do not have exact figures, approximate guesses will do)?

Before new technology	Number of workers	After new technology	Number of workers
Full-time	.....	Full time	.....
Part-time	.....	Part-time	.....
Men	.....	Men	.....
Women	.....	Women	.....
Skilled	.....	Skilled	.....
Semi-skilled	.....	Semi-skilled	.....
Unskilled	.....	Unskilled	.....

Have you noticed any changes in the types of workers being recruited? e.g. they are older/younger, more likely to be male/female, full-time/part-time, more/less skilled?

Please specify.....

.....

Have a significant number of employees been downgraded since the technology was introduced? Please give details .....

Have a significant number of employees been upgraded since the new technology was introduced? Please give details .....

Have any new jobs been created as a result of the new technology?.....

Please specify .....

Have they been filled by (please tick) Men? Women? Equally?

Has any training been given for working with the new machines?.....

Please specify.....

What new machines have been introduced? Please specify types and approximate numbers .....

.....

Would you say that working conditions have improved or deteriorated as a result of the introduction of these machines and/or processes?.....

Would you say that productivity has improved as a result of the new technology?

.....Could you say by how much?.....

Have promotion prospects improved or deteriorated?.....

Have you encountered any of the following among your fellow-workers as a result of working with new machines

	Please tick	Number of workers affected (if known)
Headaches		.....
Backache		.....
Increase in use of tranquillisers		.....
Increase in use of alcohol		.....
Increase in consumption of tea/coffee		.....
Pain in the wrists (tenosynovitis)		.....
Eye trouble (please specify)		.....
Complaints of tiredness		.....
Compaints of depression		.....

Other health effects (please specify).....

Would you say that stress has increased or decreased?.....

Do you think workers have more or less individual responsibility since the new technology was introduced?.....

Do you think they have more or less control over their work since the new technology was introduced?.....

In your opinion, has the new technology had any other significant effects?.....

Please specify) (use page 6 if necessary, for extra comments).....

.....

Do you think that the technology makes life easier or more difficult for women?

..... Why? .....

Have you used TUCRIC as a source of information?.....Was it useful?.....

How do you think the service could be improved?.....

APPENDIX II

Table 1

Estimates* of numbers of Women** in service occupations in West Yorkshire County, 1977

1968 SIC	I + II	III	IV	V	VI	VII	VIII	IX	X + XI	XII
Industry	Primary	Food, Drink & Tobacco	Coal & Petroleum Products	Chemicals & Allied Industries	Metal Manufacture	Mechanical Engineering	Instrument Engineering	Electrical Engineering	Shipbuilding etc., & Vehicles	Metal Goods n.e.s.
1. Managerial	342	-	-	-	-	-	-	-	-	-
2. Clerical	304	1,547	-	1,312	840	4,503	186	1,380	748	702
3. Scientific & Technical	-	119	-	369	-	-	-	-	-	585
4. Sales & Distribution	-	476	-	-	-	-	-	60	-	39
5. Service	-	357	-	205	60	948	-	300	133	195
Total 1 - 5 above	646	2,499	-	1,886	900	5,451	186	1,740	901	1,521
Total women employees in employment	1,900	11,900	200	4,100	2,000	7,900	600	6,000	1,700	3,900

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* Estimates arrived at by applying the ratios of number of women in employment in each of the classes 1 - 5 in each industry to total number of women employees in employment in each industry for West Yorkshire Conurbation in 1971 (Census of Popluation data) to numbers of women employees in employment in each industry in West Yorkshire County in 1977 (Census of Employment data kindly supplied by Manpower Services Commission). Estimates should not be taken as accurate to the final digit shown.

** Employees in employment

Table 1 cont'd.

1968 SIC	XXII	XXIII	XXIV	XXV	XXVI	XXVII	XXIII - XXVII		I - XXVII
Industry	Transport & Communication	Distributive Trades	Insurance, Banking, etc.	Professional & Scientific	Miscellaneous Services	Public Administration & Defence	Services		All Industries
1. Managerial	69	8,848	174	-	3,872	179	13,073		13,484
2. Clerical	4,347	12,719	13,572	15,640	6,292	11,277	59,500		90,632
3. Scientific & Technical	-	-	-	1,840	-	537	2,377		3,527
4. Sales & Distribution	1,104	24,332	348	-	1,936	-	26,616		29,263
5. Service	621	2,765	1,914	33,120	24,684	3,938	66,421		71,226
Total 1 - 5 above	6,141	48,664	16,008	50,600	36,784	15,931	167,987		208,132
Total women employees in employment	5,900	55,300	17,400	92,000	48,400	17,900	231,000		357,400

Unit Groups

Managerial Unit Groups: 002, 115, 138, 143, 147, 149, 154, 156, 159, 171, 173 - 180, 210, 216
Clerical Unit Groups: 127, 128, 139 - 142
Scientific & Technical Unit Groups: 195 - 206, 208, 209, 211, 212, 214, 217 - 220
Sales & Distribution Unit Groups: 116 - 126, 129 - 136, 144 - 146, 148, 150
Service Unit Groups: 153, 155, 157, 158, 160 - 166, 172

Table 1 cont'd.

1968 SIC	XIII	XIV	XV	XVI	XVII	XVIII	XIX	III - XIX	XX	XXI
Industry	Textiles	Leather, Leather goods & Fur	Clothing	Bricks, Pottery & Glass, etc.	Timber, Furniture, etc.	Paper, Printing & Publishing	Other Manufacturing Industries	Manufacturing	Construction	Gas, Electricity & Water
1. Managerial	-	-	-	-	-	-	-	-	-	-
2. Clerical	4,092	-	2,508	650	840	2,156	559	22,023	2,346	2,112
3. Scientific & Technical	-	-	-	-	-	77	-	1,150	-	-
4. Sales & Distribution	341	-	418	-	-	77	-	1,411	-	132
5. Service	1,023	-	-	-	-	308	-	3,549	272	363
Total 1 - 5 above	5,456	-	2,926	650	840	2,618	559	28,133	2,618	2,607
Total women employees in employment	34,100	1,500	20,900	1,300	2,800	7,700	4,300	111,000	3,400	3,300

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